Appendix B:
Best Management Practices

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B. Best Management Practices

The publications referenced in this appendix are sources of "Best Management Practices" (BMPs). BMPs are measures that have been developed by agency, industry, scientific, and/or working groups as voluntary methods for reducing environmental impacts associated with certain classes of activity. BLM typically uses these measures as guidelines or "project design features" during implementation planning at the activity and/or project-specific levels.

The list included in this appendix is not limiting, but references the most frequently used sources. As new publications are developed, BLM may consider those BMPs. In addition, many BLM handbooks (such as BLM Manual 9113-Roads and 9213-Interagency Standards for Fire and Aviation Operation) also contain BMP-type measures for minimizing impacts. These BLM-specific guidance and direction documents are not referenced in this appendix.

Planning implications: Use of Best Management Practices is not mandatory, since individual measures may not be appropriate for use in every situation. They may be added, dropped, or modified through plan maintenance.

NEPA implications: Only the wind energy development BMPs have been analyzed in a NEPA process. The use of other BMPs should be analyzed on a case-by-case basis in NEPA documents associated with projects on the public lands. These case-by-case analyses should not "tier to" the BMP publication as a way to dismiss environmental impacts (i.e., must still analyze and disclose the environmental considerations and effects associated with use of the BMP).

In this sections B.1 through B.10 reference specific documents in which to locate BMPs. Section B.11 lists BMPs by resource or resource use. Section B.12 is the BLM Wind Energy Development Program Policies and Best Management Practices (BMPs).

B.1 Air

Air Resource BMPs: Best Management Practices for Fluid Minerals (USDOI, BLM)

Developed by: U.S. Department of Interior, Bureau of Land Management

Publication reference:

Available Online:
http://www.blm.gov/style/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE_PROTECTION_/bmps.Par.60203.File.dat/WO1_Air%20Resource_BMP_Slideshow%2005-09-2011.pdf

Description: Updated in May 2011, this Power Point presentation provides a summary of typical Best Management Practices (BMPs) for protecting air resources during oil and gas development

and production operations. Emission reduction BMPs are provided for criteria air pollutants, hazardous air pollutants, volatile organic compounds (an ozone precursor), and greenhouse gases. Emission source types include combustion emissions from mobile and stationary sources, fugitive emissions, and stationary source vented emissions from non-combustion sources. Emission controls include transport reduction strategies and fugitive dust controls, as well as emission control techniques for drilling, completion, and production. Emission monitoring and maintenance strategies are also addressed. This document provides a partial list of air resource BMPs and includes links to many additional BMP descriptions that addressing technical and economic considerations.

B.2 Water

Water Quality BMPs (Best Management Practices) for Montana Forests

Developed by: MSU Extension Service, Missoula, Montana, in cooperation with the Montana Department of Natural Resources & Conservation, Forestry Division Montana Logging Association.(Logan, Robert. 2001).

Publication Reference: Publication EB 158

Available from: Conservation Districts Bureau, DNRC, P.O. Box 20160, Helena, MT. 59620-1601, or MSU Extension Forestry, 32 Campus Drive, Missoula, MT 59812, or MSU Extension Publications, P.O. Box 172040, Bozeman, MT 59717.

Description: Discusses methods for managing forest land, while protecting water quality and forest soils. These BMPs are intended for all forest land in Montana, including non-industrial private, forest industry, and state or federally-owned forests. These are preferred (but voluntary) methods that go beyond Montana State Streamside Management Zone Law. These BMPs includes definitions, basic biological information, and BMPs for: Streamside Management Zones, road design, use, planning and location, construction, drainage and closure, stream crossings, soils, timber harvesting methods, reforestation, winter planning, and clean-up.

Montana Guide to the Streamside Management Zone Law

Developed by: Montana Department of Natural Resources and Conservation Service Forestry Bureau, in cooperation with Montana Department of Environmental Quality, Montana Logging Association, Montana Wood Products Association, Plum Creek Timber LP, USDA Forest Service, USDI Bureau of land Management.

Publication Reference: Revised 2006; reprinted November 2006

Available from: Montana Department of Natural Resources and Conservation, 2705 Spurgin Road, Missoula, MY 59801-3199 or local MY DNRC field offices.

Description: MT State Law (77-5-301[1] MCA). Complementary BMPs are found in the Water Quality BMPs for Montana Forests (also referenced in the appendix). Provides definitions,

stream classifications, guidelines and exceptions on the seven forest practices prohibited by Montana law in Stream Management Zones: 1. broadcast (Slash) burning, 2. operation of wheeled or tracked vehicles except on established roads, 3. the forest practice of clearcutting, 4. the construction of roads, except when necessary to cross a stream or wetlands; 5. the handling, storage, application, or disposal of hazardous or toxic materials in a manner that pollutes streams, lakes, or wetland, or that may cause damage or injury to humans, land, animals or plants; 6. the side casting of road material into a stream, lake, wetland, or watercourse; and 7. the deposit of slash in streams, lakes, or other water bodies.

Erosion and Sediment Control Practices: Field Manual

Developed by: Prepared for the Montana Department of Transportation

Publication reference: FHWA/MT-030003/8165

Available From: National Technical Information Service, Springfield, VA 21161

Description: The Erosion and Sediment Control Best Management Practices Construction Field Manual was developed to assist in design, construction, and post-construction phases of MDT projects. This manual provides background to concepts of Erosion and Sediment Control. Most of MDTs Best Management Practices are listed within the manual based on application categories. Each BMP is described; its applications and limitations are listed, as well as its design criteria. Construction phase and post-construction phase BMPs are described. This manual is a field guide and condensed version of the Erosion and Sediment Control Design Construction Best Management Practices Manual. For more detailed discussion on topic found within, refer to the Erosion and Sediment Control Construction Best Management Practices Manual.

Erosion and Sediment Control Practices: Reference Manual

Developed by: Prepared for the Montana Department of Transportation

Publication reference: FHWA/MT-030003/8165

Available From: National Technical Information Service, Springfield, VA 21161

Description: The Erosion and Sediment Control Construction Best Management Practices Manual was developed to assist in the design, construction, and post-construction phases of MDT projects. This manual provides background to State and Federal regulations associated with erosion and sediment control practices including a general overview of the erosion and sediment processes. Best Management practices are listed within the manual based on application categories. Each BMP is described; its applications and limitations are listed, as well as its design criteria. The design phase includes development of construction plans, NOI, and SWPPP. Construction phase includes the finalization of the SWPPP, NOI, and the implementation of BMPs. Post-Construction phase includes monitoring, maintenance, and removal activities.

Montana Non-Point Source Management Plan

Developed by: Montana Department of Environmental Quality, Water Quality Planning Bureau, Watershed Protection Section

Publication reference: 2007

Available From: Montana Department of Environmental Quality, Water Quality Planning Bureau, Watershed Protection Section, P.O. Box 200901, Helena, MT 59620-0901

Online at:
http://www.deq.state.mt.us/wqinfo/nonpoint/2007NONPOINTPLAN/Final/NPSPlan.pdf

Description: This document describes the Montana Department of Environmental Quality's (DEQ) updated strategy for controlling nonpoint source (NPS) water pollution, which is the state's single largest source of water quality impairment. NPS pollution is contaminated runoff from the land surface that can be generated by most land use activities, including agriculture, forestry, urban and suburban development, mining, and others. Common NPS pollutants include sediment, nutrients, temperature, heavy metals, pesticides, pathogens, and salt. The purpose of the Montana NPS Pollution Management Plan (Plan) is: 1) to inform the state's citizens about NPS pollution problems and 2) to establish goals, objectives, and both long-term and short-term strategies for controlling NPS pollution on a statewide basis. The goal of Montana's NPS Management Program is to protect and restore water quality from the impacts of non-point sources of pollution in order to provide a clean and healthy environment.

National Menu of Stormwater Best Management Practices (US EPA)

Developed by: U.S. Environmental Protection Agency

Publication reference:

Available Online: http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm

Description: The National Menu of Best Management Practices for Stormwater Phase II was first released in October 2000. EPA has renamed, reorganized, updated, and enhanced the features of the website. These revisions include the addition of new fact sheets and revisions of existing fact sheets. Because the field of stormwater is constantly changing, EPA expects to update this menu as new information and technologies become available. The Menu of BMPs is based on the Stormwater Phase II Rule's six minimum control measures.

1. Public Education - BMPs for MS4s to inform individuals and households about ways to reduce stormwater pollution.
2. Public Involvement - BMPs for MS4s to involve the public in the development, implementation, and review of an MS4's stormwater management program.
3. Illicit Discharge Detection & Elimination - BMPs for identifying and eliminating illicit discharges and spills to storm drain systems.

4. Construction - BMPs for MS4s and construction site operators to address stormwater runoff from active construction sites.
5. Post Construction - BMPs for MS4s, developers, and property owners to address stormwater runoff after construction activities have completed.
6. Pollution Prevention/Good Housekeeping- BMPs for MS4s to address stormwater runoff from their own facilities and activities.

Water-Road Interaction Technology Series Documents (USFS) May 2000

Available at: http://www.stream.fs.fed.us/water-road/

B.3 Invasive Species and Noxious Weeds

Invasive Species: Final Vegetation Treatments using Herbicides on BLM in 17 Western States

Developed By: Bureau of Land Management

Publications reference: U.S. Department of the Interior Bureau of Land Management (BLM). 2007. Vegetation Treatments Using Herbicides on BLM in 17 Western States. Programmatic Environmental Impact Statement, Final. ROD: September 29, 2007. BLM/WO/GI/-07/018+6711

Available from: http://www.blm.gov/wo/st/en/prog/more/veg_eis.html

Description: Considered activities, including noxious weed and invasive terrestrial plant species management, hazardous fuels reduction treatments, emergency stabilization and rehabilitation efforts. Addressed human health and ecological risk for the use of chemical herbicides on public lands and provided a cumulative impact analysis addressing the use of chemical herbicides in conjunction with other treatment methods.

The ROD also identifies which standard operation procedures must be used with all applications of herbicides. Standard operation procedures are found in Appendix B of the ROD.

BLM must also implement additional measures to mitigate potential adverse environmental effects of using herbicides as appropriate from site specific assessments to ensure that all practicable means to avoid or minimize environmental harm have been adopted. All BLM District and Field Offices must adhere to the mitigation measures listed in Appendix C of the ROD.

To prevent the spread of noxious weeds and invasive plants, the BLM will follow prevention measures to minimize the amount of existing non-target vegetation that is disturbed during project planning. Preventions measures are found in Table 2-7, on page 2-24 of the Final

Programmatic EIS (June 2007) and ROD (September 2007). (PEIS)

B.4 Wildlife Habitat

Suggested Practices for Avian Protection on Power Lines: State of the Art in 2006 Avian Power Line Interaction Committee (APLIC).

Developed by: First published in 1975 (Miller et al.), later updated in 1981 (Olendorff et al.) and most recently revised in 1996 by Edison Electric Institute and the Avian Power Line Interaction Committee (APLIC) in collaboration with the Raptor Research Foundation. 2006

Publication reference: CEC-500-2009-022

Available from: Santa Cruz Predatory Bird Research Group morning@ucsc.edu, Avian Power Line Interaction Committee www.aplic.org, Edison Electric www.eei.org, California Energy Commission www.energy.ca.gov

Description: Examines the history of raptor-power line interactions from biological and electrical standpoints; and proposes specific solutions for reducing avian-caused electrical outages and avian fatalities through cooperative measures between utilities, industry, and federal and state agencies.

Com Towers etc.

The following is an attachment from a USFWS Memo from the Director of USFWS pertaining to management guidance for the protection of wildlife for siting, construction, operation, and decommissioning of communication towers dated September 14, 2000.

Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning

1. Any company/applicant/licensee proposing to construct a new communications tower should be strongly encouraged to collocate the communications equipment on an existing communication tower or other structure (e.g., billboard, water tower, or building mount). Depending on tower load factors, from 6 to 10 providers may collocate on an existing tower.
2. If collocation is not feasible and a new tower or towers are to be constructed, communications service providers should be strongly encouraged to construct towers no more than 199 feet above ground level, using construction techniques which do not require guy wires (e.g., use a lattice structure, monopole, etc.). Such towers should be unlighted if Federal Aviation Administration regulations permit.
3. If constructing multiple towers, providers should consider the cumulative impacts of all of those towers to migratory birds and threatened and endangered species as well as the impacts of each individual tower.
4. If at all possible, new towers should be sited within existing "antenna farms" (clusters of towers). Towers should not be sited in or near wetlands, other known bird

concentration areas (e.g., State or Federal refuges, staging areas, rookeries), in known migratory or daily movement flyways, or in habitat of threatened or endangered species. Towers should not be sited in areas with a high incidence of fog, mist, and low ceilings.

5. If taller (>199 feet AGL) towers requiring lights for aviation safety must be constructed, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used. Unless otherwise required by the FAA, only white (preferable) or red strobe lights should be used at night, and these should be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA. The use of solid red or pulsating red warning lights at night should be avoided. Current research indicates that solid or pulsating (beacon) red lights attract night-migrating birds at a much higher rate than white strobe lights. Red strobe lights have not yet been studied.
6. Tower designs using guy wires for support which are proposed to be located in known raptor or waterbird concentration areas or daily movement routes, or in major diurnal migratory bird movement routes or stopover sites, should have daytime visual markers on the wires to prevent collisions by these diurnally moving species. (For guidance on markers, see Avian Power Line Interaction Committee (APLIC). 1994. Mitigating Bird Collisions with Power Lines: The State of the Art in 1994. Edison Electric Institute, Washington, D.C., 78 pp, and Avian Power Line Interaction Committee (APLIC). 1996. Suggested Practices/or Raptor Protection on Power Lines. Edison Electric Institute Raptor Research Foundation, Washington, D. C; 128 pp. Copies can be obtained via the Internet at http://www.eei.org/resources/pubcat/enviro or by calling 1-800/334-5453).
7. Towers and appendant facilities should be sited, designed and constructed so as to avoid or minimize habitat loss within and adjacent to the tower "footprint." However, a larger tower footprint is preferable to the use of guy wires in construction. Road access and fencing should be minimized to reduce or prevent habitat fragmentation and disturbance, and to reduce above ground obstacles to birds in flight.
8. If significant numbers of breeding, feeding, or roosting birds are known to habitually use the proposed tower construction area, relocation to an alternate site should be recommended. If this is not an option, seasonal restrictions on construction may be advisable in order to avoid disturbance during periods of high bird activity.
9. In order to reduce the number of towers needed in the future, providers should be encouraged to design new towers structurally and electrically to accommodate the applicant/licensee's antennas and comparable antennas for at least two additional users (minimum of three users for each tower structure), unless this design would require the addition of lights or guy wires to an otherwise unlighted and/or unguyed tower.
10. Security lighting for on-ground facilities and equipment should be down-shielded to keep light within the boundaries of the site.

11. If a tower is constructed or proposed for construction, Service personnel or researchers from the Communication Tower Working Group should be allowed access to the site to evaluate bird use, conduct dead-bird searches, to place net catchments below the towers but above the ground, and to place radar, Global Positioning System, infrared, thermal imagery, and acoustical monitoring equipment as necessary to assess and verify bird movements and to gain information on the impacts of various tower sizes, configurations, and lighting systems.
12. Towers no longer in use or determined to be obsolete should be removed within 12 months of cessation of use.

In order to obtain information on the extent to which these guidelines are being implemented, and to identify any recurring problems with their implementation which may necessitate modifications, letters provided in response to requests for evaluation of proposed towers should contain the following request:

"In order to obtain information on the usefulness of these guidelines in preventing bird strikes, and to identify any recurring problems with their implementation which may necessitate modifications, please advise us of the final location and specifications of the proposed tower, and which of the measures recommended for the protection of migratory birds were implemented. If any of the recommended measures cannot be implemented, please explain why they were not feasible."

B.5 Wildland Fire Ecology and Management

Interagency Burned Area Emergency Response Handbook

Guidebook version 1.3 October 2006

Developed by: DOI, Bureau of Land Management

Publication reference: Interagency Burned Area Rehabilitation Guidebook, Interpretation of Department of the Interior 620 DM 3, For the Burned Area Rehabilitation of Federal and Tribal Trust Lands, Version 1.3.

Available from: http://www.fws.gov/fire/ifcc/esr/Policy/BAR_Guidebook11-06.pdf (last accessed 6/10/2011)

Description: Interpretation of Department of the Interior 620 DM 3 for the burned area rehabilitation of Federal and Tribal Trust Lands.

Burned Area Emergency Stabilization and Rehabilitation Handbook

Developed by: DOI, Bureau of Land Management

Publication reference: Burned Area Emergency Stabilization and Rehabilitation Handbook (H-1742-1, 2007)

Available from:
http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.52739.File.dat/h1742-1.pdf (last accessed 6/10/2011)

Description: This document addresses the process for implementing emergency fire rehabilitation projects following wildland fires.

Interagency Standards for Fire and Fire Aviation Operations (Redbook)

Developed by: Department of the Interior; Bureau of Land Management, U.S. Fish and Wildlife Service, and National Park Service, and Department of Agriculture; U.S. Forest Service

Available from: National Interagency Fire Center, 3833 S. Development Avenue
Boise, Idaho 83705-5354 http://www.nifc.gov/policies/pol_ref_redbook_2011.html (last accessed 6/10/2011)

Description: This document addresses specific action items that are contained in the Guidance for Implementation of Federal Wildland Fire Management Policy (February 13, 2009).

B.6 Fluid Minerals

Best Management Practices for Oil and Gas Development on Public Lands

Available from: http://www.blm.gov/bmp/Technical_Information.htm

BMPs for Fluid Minerals

Developed by: Bureau of Land Management

Publication reference: BLM/WO/ST-06/021+3071/REV 07

Available from: Online at: http://www.blm.gov/bmp/

Description: BMPs for oil and gas demonstrate practical ideas which may eliminate or minimize adverse impacts from oil and gas development to public health and the environment, landowners, and natural resources; enhance the value of natural and landowner resources; and reduce conflict. The publication reference is to the "Gold Book" which is formally titled "Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development." In addition, the first internet citation is to a location maintained by the Washington Office of the BLM containing general and technical information on the use and application of BMPs. The second location refers the reader directly to an online version of the "Gold Book." The third and fourth locations refer the reader to color charts for use in selecting paint colors for oil and gas facilities.

Western Governors' Association Coal Bed Methane BMPs Handbook

http://www.westgov.org/wga/initiatives/coalbed/

Handbook on Best Management Practices and Mitigation Strategies for Coal Bed Methane in the Montana Portion of the Powder River Basin

Prepared for: U.S. Department of Energy National Petroleum Technology Office National Energy Technology Laboratory Tulsa, Oklahoma

Developed by: Lead researcher: ALL Consulting Tulsa, Oklahoma; and Co-researcher ; the Montana Board of Oil & Gas Conservation Billings, Montana.

Publication reference:

Available Online: http://bogc.dnrc.state.mt.us/website/mtcbm/webmapper_cbm_info_res.htm; last accessed 9/8/2010

Description: This handbook is intended to serve as a resource to industry, regulators, land managers, and concerned citizens. The handbook presents background information on CBM activity in the Montana portion of the Powder River Basin (Study Area) while also presenting a number of Best Management Practices and Mitigation Strategies specific to CBM that have been successfully used throughout the United States.

B.7 Coal

Coal Mining BMPs

Developed by: Office of Water, Office of Science and Technology, Engineering and Analysis Division, U.S. Environmental Protection Agency

Publication reference: COAL REMINING, BEST MANAGEMENT PRACTICES GUIDANCE MANUAL, MARCH 2000

Available From: Office of Water Office of Science and Technology Engineering and Analysis Division U.S. Environmental Protection Agency Washington DC, 20460

Description: The manual was created to support EPA's proposal of a Re-mining subcategory under existing regulations for the Coal Mining industry. The purpose of this guidance manual is to assist operators in the development and implementation of a best management practice (BMP) plan specifically designed for a particular re-mining operation. This guidance manual was also developed to give direction to individuals reviewing remining applications and associated BMP plans. This document is not intended as a substitute for thoughtful and thorough planning and decision making based on site-specific information and common sense.

B.8 Mineral Materials

Mineral materials site BMP (construction and stormwater)

Developed by: U.S. Environmental Protection Agency, adopted by Montana DEQ

Publication Reference: The National Menu of Best Management Practices for Stormwater Phase II, EPA, October, 2000.

Description: EPA has found the practices listed in the menu of BMPs to be representative of the types of practices that can successfully achieve the minimum control measures. The list of BMPs is not all-inclusive, and it does not preclude MS4s from using other technically sound practices. However, in all cases the practice or set of practices chosen needs to achieve the minimum measure.

EPA also recognizes that some MS4s may already be meeting the minimum measures, or that only one or two additional practices may be needed to achieve the measures. Existing stormwater management practices should be recognized and appropriate credit given to those who have already made progress toward protecting water quality. There is no need to spend additional resources for a practice that is already in existence and operational.

B.9 Livestock Grazing

Montana Best Management Practices for Grazing

Developed by: Working group with representation from: MSU College of Agriculture, Society of American Fisheries, Montana Stockgrowers Association, Montana Woolgrowers Association, USDI Bureau of Land Management, USDA Forest Service, USDA Natural Resources Conservation Service, Montana Farm Bureau, and Montana Department of Natural Resource and Conservation.

Publication reference: N/A, first printed in 1999

Available From: Conservation Districts Bureau, and Montana Department of Natural Resources and Conservation, P.O. Box 201601, Helena MT 59620-1601.

Description: Describes BMPs for livestock grazing designed to protect and enhance water quality, soils, plant communities, and other rangeland resources. Explains how and why to use BMPs to manage upland rangeland, forested rangeland, and riparian areas; and describes how grazing BMPs fit into a grazing management plan.

B.10 Transportation and Facilities

Low Volume Roads Engineering Best Management Practices Field Guide (U.S. Forest Service)

Developed by: US Agency for International Development (USAID) with the cooperation of the USDA, the Forest Service, the Office of International Programs, and the International Programs Department at Virginia Polytechnic Institute and State University. (Gordon Keller & James Sherar USDA Forest Service/USAID).

Available on line:
http://ntl.bts.gov/lib/24000/24600/24650/Chapters/B_Preface_TableOfContents_Glossary.pdf

Description: The basic objective of this guide is to help engineers, planners, environmental specialists, and road managers make good decisions, protect the environment, and build good low-volume roads. This Low-Volume Roads Engineering Best Management Practices Field Guide is intended to provide an overview of the key planning, location, design, construction, and maintenance aspects of roads that can cause adverse environmental impacts and to list key ways to prevent those impacts. Best Management Practices are general techniques or design practices that, when applied and adapted to fit site specific conditions, will prevent or reduce pollution and maintain water quality. BMPs for roads have been developed by many agencies since roads often have a major adverse impact on water quality, and most of those impacts are preventable with good engineering and management practices. Roads that are not well planned or located, not properly designed or constructed, not well maintained, or not made with durable materials often have negative effects on water quality and the environment.

Road Construction and maintenance: H-9113-1—Road Design Handbook.

BLM Manual: M9113

Developed by:

Publication reference:

Available from:

Description:

B.11 Resource Program Best Management Practices (BMPs)

Best management practices (BMP) are those land and resource management techniques determined to be the most effective and practical means of maximizing beneficial results and minimizing conflicts and adverse environmental impacts of management actions. BMPs could include, but are not limited to structural and nonstructural controls, specific operations, and maintenance procedures. BMPs can be applied before, during and after activities to reduce or eliminate adverse environmental impacts. BMPs are not one-size-fits-all solutions. BMPs should be matched and adapted through interdisciplinary analysis to determine which management practices would be necessary to meet the goals and objectives in the Resource Management Plan (RMP). The actual practices and mitigation measures that are best for a particular site are evaluated through the site-specific National Environmental Policy Act (NEPA) process and vary to accommodate unique site-specific and local resource conditions.

BMPs described in this appendix are designed to assist in achieving the RMP objectives. These guidelines could apply, where appropriate, to all use authorizations, including projects initiated by the Bureau of Land Management (BLM). BMPs are dynamic, and should not be interpreted as specific direction at the same level as the RMP decisions. BMPs are selected and implemented as necessary, based on site-specific conditions, to meet resource objectives for specific management actions.

This appendix does not provide an exhaustive list of BMPs. Additional BMPs may be identified during an interdisciplinary process when evaluating site-specific management actions. Implementation and effectiveness of BMPs must be monitored to determine whether the practices are achieving RMP goals and objectives. Adjustments could be made as necessary to ensure RMP goals and objectives are being met, as well as to conform with changes in BLM regulations, policy, direction, or new scientific information. BMPs may also be updated as new technology emerges. In addition, applicants can suggest alternate conditions that could accomplish the same result.

Because the management of environmental impacts is an ongoing process, continual refinement of BMP design is necessary. This process can be described in these five steps: (1) selection of design of a specific BMP; (2) application of the BMP; (3) monitoring; (4) evaluation; and (5) feedback. Data gathered through monitoring is evaluated and used to identify changes needed in BMP design or application or in the monitoring program.

These best management practices have been organized by the primary resource the best management practices could benefit or protect. Each best management practice could actually be implemented by a number of resource programs within the Field Office. Best management practices would be implemented at the discretion of the Billings Field Office on a project-specific basis, depending on the specific characteristics of the project area and the types of disturbance being proposed. They may not be appropriate to implement in all cases. It has been assumed for impact analysis that best management practices would be implemented whenever appropriate.

Surface Disturbing Activities

- Evaluate areas subject to surface disturbance for the presence of cultural and paleontological resources/values. This is usually accomplished through the completion of a cultural and paleontological inventory. An on-the-ground inspection by a qualified archaeologist and/or paleontologist is required. In cases where cultural and/or paleontological resources are found, the preferred response would be to modify the proposed action to avoid the cultural/paleontological resource (avoidance). If avoidance is not possible, actions would be taken to preserve the data or value represented by the cultural resource (mitigation).

- Evaluate areas subject to surface disturbance for the presence of threatened, endangered or candidate animal or plant species. This is usually accomplished through the completion of a biological inventory. An on-the-ground inspection by a qualified biologist is required. In cases where threatened, endangered, or candidate species are affected, the preferred response would be to modify the proposed action to avoid species or their habitat (avoidance). If avoidance of a threatened, endangered, or candidate species or its habitat is not possible, a Section 7 consultation with USFWS would be required, and a biological assessment would be prepared to recommend actions to protect the species or its habitat.

- Consider requiring special design and reclamation measures to protect scenic and natural landscape values. These may include transplanting trees and shrubs, mulching and fertilizing disturbed areas, use of low-profile permanent facilities, and painting to minimize visual contrasts. Surface disturbing activities may be moved to avoid sensitive areas or to reduce the visual effects of the proposal.

- Design above-ground facilities requiring painting to blend in with the surrounding environment.

- Implement reclamation concurrent with construction and site operations to the extent possible. Final reclamation actions shall be initiated within 6 months of the termination of operations unless otherwise approved in writing by the authorized officer.

- Ensure fill material is pushed into cut areas and up over back slopes. Depressions should not be left that would trap water or form ponds.

Air

Impacts to air resources and air quality related values (AQRVs) can be reduced using the following BMPs.

a) Fugitive dust emissions can be reduced by:

1) using two-track primitive roads whenever possible rather than developing a dirt road;

2) applying water or chemical suppressants (e.g., magnesium chloride, calcium chloride, lignin, sulfonate, or asphalt emulsion) to non-primitive unpaved roads or surfacing non-primitive unpaved roads with gravel, chip-seal, or asphalt;

3) imposing vehicle speed limits on unpaved roads;

4) restricting the extent of surface impacts during construction activities and ongoing operations by using directional drilling to reduce the number of oil and gas well pads;

5) using dust abatement techniques before, during, and after surface clearing and excavation activities;

6) covering construction materials and stockpiled soils if they are a source of fugitive dust;

7) suspending construction activities during high winds;

8) adding gravel to non-reclaimed well pad areas;

9) re-vegetating areas when construction is complete;

10) locating linear facilities in the same or parallel trenches and constructing them at the same time; and

11) mowing rather than removing vegetation.

b) Fugitive dust and vehicle exhaust emissions related to oil and gas activity can be reduced by restricting vehicle trips by:

1) consolidating facilities by using directional drilling and multiwell oil and gas pads;

2) developing centralized liquid collection (water, produced water, and fracturing liquid) facilities and production (treatment and product storage) facilities to reduce the number and average distance of vehicle trips;

3) using shuttles or vanpools for employee commuting;

4) using automated equipment and remote telemetry; and

5) using solar power to add automated equipment in areas without access to electricity.

c) Non-vehicular engine exhaust emissions can be reduced by:

6) electrifying equipment when feasible;

7) achieving high levels of emission control by installing and operating low-emission equipment (i.e., drill rig engines with emissions at least as low as Tier 4 engine standards) or operating older equipment that has been retrofitted with additional emission controls such as nonselective catalytic reduction or catalytic oxidation;

8) using natural gas or electric engines rather than diesel engines;

9) using alternative energy (solar power, wind power, or both) to power new water source developments; and

10) converting power sources at existing water well developments to alternative energy sources.

d) Fugitive volatile organic compound (VOC), hazardous air pollutant (HAP), and/or methane (a greenhouse gas [GHG]) emissions from oil and gas activities can be reduced by the following BMPs when feasible:

1) using green completion technology to capture methane (and some VOC and HAP) emissions during completion and place the gas in sales pipelines;

2) using flaring rather than venting during completion activities, but only in cases where product capture is not feasible;

3) using closed tanks rather than open tanks or pits;

4) installing vapor recovery units on storage tanks;

5) using vapor balancing during condensate and oil tanker truck loading;

6) using closed-loop drilling;

7) replacing pneumatic (natural gas) pumps with electric or solar pumps;

8) optimize glycol circulation rates on glycol dehydrators;

9) replacing wet seals with dry seals in centrifugal compressors;

10) replacing worn rod packing in reciprocating compressors;

11) installing automated plunger lift systems in natural gas wells; and monitoring equipment leaks and repairing equipment leaks.

Soil

- Surface disturbance on sustained slopes over 25%, would require reclamation and mitigation planning that demonstrates how site productivity will be restored.
- Surface runoff will be adequately controlled using mitigations such as: water bars, fiber mats, contour felling, and vegetative filters.
- Off-site areas will be protected from accelerated erosion, such as rilling, gullying, piping, and mass wasting.
- Surface-disturbing activities will not be conducted during extended wet periods.
- Construction will not be allowed when soils are frozen.
- Construction activities will be restricted during wet or muddy conditions and will be designed following BMPs to control erosion and sedimentation.
- Surface disturbing activities are to be avoided in areas of active mass movements (landslides and slumps) (MT-11-2)
- Erosion control and sited restoration measures will be initiated within one year of completion of a project. Disturbed areas will be re-contoured to provide proper drainage.
- Interim reclamation for long-term projects would be considered at the project level plan and could include seeding with BLM-approved seed mixtures.
- All surface disturbances are to be reseeded/re-vegetated with native plant species common to the site's natural plant community. Site specific planning may warrant the use, on a case by case basis, of introduced species where difficult site stabilization or wildlife concerns prevail.
- Require a temporary protection surface treatment such as mulch, matting and netting for the reclamation of all mechanically-disturbed areas (this excludes wildland fire).
- Speed restrictions for areas susceptible to wind erosion i.e., 25 mph, limited travel
- Use of saline dust inhibitors
- Areas with steep topography will be developed in accordance with the BLM Gold Book (United States Department of the Interior and United States Department of Agriculture 2007) requirements. Lease roads and constructed facilities will be located in accordance with the approved APD. In areas of construction, topsoil will be stockpiled separately from other material, and be reused in reclamation of the disturbed areas. Unused portions of the producing well site will have topsoil spread over it and will be reseeded

- Construction activities will be restricted during wet or muddy conditions and will be designed following BMPs to control erosion and sedimentation. If porous subsurface materials are encountered during pit construction, all onsite fluid pits will be lined. During road and utility ROW construction, surface soils will be stockpiled adjacent to the cuts and fills.
- Stream crossings will be designed to minimize impacts and not impede stream flow. Erosion control measures will be maintained and continued until adequate vegetation cover (as defined by BLM on a case-by-case basis) is reestablished. Vegetation will be removed only when necessary. Water bars will be constructed on slopes of 3:1 or steeper.
- Erosion control and site restoration measures will be initiated as soon as a particular area is no longer needed for exploration, production, staging, or access. Disturbed areas will be recontoured to provide proper drainage.
- The road ditches would be flat bottomed and "V" ditches not allowed. Place water turn outs where appropriate to lessen the water impacts upon the ditches.
- Topsoil piles may be required to be seeded following the BLM seeding policy.
- Displaced farmland, whether in crop production or not, will be reclaimed to original soil productivity through adoption of standard reclamation procedures.
- Require the use of specialized low-surface impact equipment (e.g. balloon tired vehicles) or helicopters, as determined by the BLM Authorized Officer, for activities in off-road areas where it is deemed necessary to protect fragile soils and other resources.
- During periods of adverse soil moisture conditions caused by climatic factors such as thawing, heavy rains, snow, flooding, or drought, suspend activities on existing roads that could create excessive surface rutting. When adverse conditions exist, the operator/permittee would contact the BLM Authorized Officer for an evaluation and decision based on soil types, soil moisture, slope, vegetation, and cover.
- When preparing the site for reclamation, include contour furrowing, terracing, reduction of steep cut and fill slopes, and the installation of water bars, as determined appropriate for site-specific conditions.
- Restoration requirements include reshaping, re-contouring, and/or resurfacing with topsoil, installation of water bars, and seeding on the contour. Removal of structures such as culverts, concrete pads, cattle guards, and signs would usually be required. Fertilization and/or fencing of the disturbance may be required. Additional erosion control measures (e.g. fiber matting and barriers) to discourage road travel may be required.

Climate

- Reduce CO2 emissions by reducing vehicle miles traveled and using fuel-efficient vehicles.
- Reduce CO2 emissions by using renewable energy to power equipment.
- Reduce CO2 emissions by using energy-saving techniques.
- Identify and implement methods to sequester CO2.
- Reduce methane emissions from oil and gas activities by:
  - capturing methane using green completion, when feasible, and beneficially using the gas by placing it in sales pipeline;
  - flaring methane during well completion activities for which green completion is infeasible;
  - replacing natural gas driven pneumatic equipment with solar or electrically powered equipment;
  - optimizing glycol recirculation rates for glycol dehydrators;
  - operating flash tank separators on glycol dehydrators;
  - identifying fugitive emissions from equipment leaks and repairing or replacing seals, valves, compressor rod packing systems, and pneumatic devices; and
  - implementing additional GHG emission reduction strategies from the oil and gas BMPs located at http://www.blm.gov/style/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE_PROTECTION_/bmps.Par.60203.File.dat/WO1_Air%20Resource_BMP_Slideshow%2005-09-2011.pdf and the EPA Natural Gas Star website at http://www.epa.gov/gasstar/tools/recommended.html.

Water/Wetlands/Riparian etc.

- Avoid locating roads, trails, and landings in wetlands.
- Locate, identify, and mark riparian management areas during design of projects that may cause adverse impacts to riparian management areas.
- Keep open water free from slash.
- Avoid equipment operation in areas of open water, seeps, and springs.

- Use low ground pressure equipment (flotation tires or tracked) as necessary to minimize rutting and compaction.
- All linear and underground facilities crossing riparian areas or wetlands would be bored, unless an approved mitigation plan illustrates a maintenance or improvement to the riparian area or wetland.(alt table)
- If riparian zones are fenced to exclude grazing, fences will be 100' from the stream banks, unless site-specific circumstances dictate otherwise.
- Water well and spring mitigation agreements will be used to facilitate the replacement of groundwater that may be lost to drawdown. Replacement water may require supply from offsite sources.
- Avoid the application of fire retardant or foam within 300 feet of a stream channel or waterway, when possible, except for the protection of life and property. Aerial application and use of retardants and foams would be consistent with national policy guidelines established by the National Office of Fire and Aviation, as amended.
- Fire engines that have surfactant foam mixes in tanks must be fitted with an anti-siphon (back flow protection valve) if filled directly from a stream channel.
- Construct a containment barrier around all pumps and fuel containers utilized within 100 feet (30.5 meters) of a stream channel. The containment barrier would be sufficient size to contain all fuel being stored or used on site.
- Prior to use on lands administered by the Billings Field Office, all fire suppression equipment from outside the planning area utilized to extract water from lakes, streams, ponds, or spring sources (e.g. helicopter buckets, draft hoses, and screens) will be thoroughly rinsed to remove mud and debris and then disinfected to prevent the spread of invasive aquatic species. Rinsing equipment with disinfectant solution will not occur within 100 feet of natural water sources (i.e. lakes, streams, or springs). Suppression equipment utilized to extract water from water sources known to be contaminated with invasive aquatic species, as identified by the U.S. Fish and Wildlife Service and Montana Fish, Wildlife, and Parks, also will be disinfected prior to use elsewhere on lands administered by the Billings Field Office.
- Do not dump surfactant foam mixes from fire engines within 600 feet of a stream channel.
- Do not conduct fire retardant mixing operations within 600 feet of a stream channel.
- Remove all modifications made to impound or divert stream flow by mechanical or other means to facilitate extraction of water from a stream for fire suppression efforts when suppression efforts are completed.

- When drafting or dipping water during fire operations, continuously monitor water levels at the site that water is being removed from. Do not allow water extraction to exceed the ability of the recharge inflow to maintain the water levels that exist at the time initial attach efforts began. If the water level drops below this predetermined level, all water removal would cease immediately until water levels are recharged.
- When possible, do not cross or terminate fire control lines at the stream channel. Terminate control lines at the edge of the riparian zone at a location determined appropriate to meet fire suppression objectives based on fire behavior, vegetation/fuel types, and fire fighter safety.
- Do not construct new roads or mechanical fire control lines or improve existing roads within 300 feet of a stream channel unless authorized by the BLM Field Manager or Authorized Officer.
- Limit stream crossings on travel routes and trails to the minimal number necessary to minimize sedimentation and compaction. The BLM Authorized Officer will determine if any impacts need to be rehabilitated by the permittee.
- Conduct mixing of herbicides and rinsing of herbicide containers and spray equipment only in areas that are a safe distance from environmentally sensitive areas and points of entry to bodies of water (storm drains, irrigation ditches, streams, lakes, or wells).
- When used to pump water from any pond or stream, screen the intake end of the draft hose to prevent fish from being ingested. Screen opening would be a minimum of 3/16 inch (4.7 mm).

Vegetation

- Where seeding is required, use appropriate seed mixture and seeding techniques approved by the BLM Authorized Officer.
- Keep removal and disturbance of vegetation to a minimum through construction site management (e.g. using previously disturbed areas and existing easements, limiting equipment/materials storage and staging sites, etc.).
- Generally conduct reclamation with native seeds that are representative of the indigenous species present in the adjacent habitat. Document rationale for potential seeding with selected nonnative species. Possible exceptions would include use of nonnative species for a temporary cover crop to out-compete weeds. In all cases, ensure seed mixtures are approved by the BLM Authorized Officer prior to planting.
- Certify that all interim and final seed mixes, hay, straw, and hay/straw products are free of plant species listed on the Montana noxious weed list.

- An area is considered to be satisfactorily reclaimed when all disturbed areas have been recontoured to blend with the natural topography, erosion has been stabilized, and an acceptable vegetative cover has been established. Use established guidelines to determine if revegetation has been successful.

Vegetation - Rangelands

- The perennial plant cover of the reclaimed area would equal or exceed perennial cover of selected comparison areas normally, adjacent habitat. If the adjacent habitat is severely disturbed, an ecological site description may be used as a cover standard. Selected cover can be determined using a method as described in Sampling Vegetation Attributes, Interagency Technical Reference, 1996, BLM/RS/ST-96/002+1730. The reclamation plan for the area project would identify the site-specific release criteria and associated statistical methods in the reclamation plan or permit.

- Surface disturbing exploration operations would be subject to site specific stipulations found in Appendix C.

- Disturbed areas resulting from any construction will be seeded in accordance with the BLM seeding policy (USDI BLM, 1999c) or surface owner‘s requirements. Depending on surface ownership, seeding is usually required during the fall or spring.

- Should the reseeding of sagebrush be required, different seeding times and techniques will be required. To the extent practicable, vegetation will be preserved and protected from construction operations and equipment except where clearing operations are required to conduct oil and gas operations, such as for roads, well pads, pipelines, power lines, utility lines, and structures. Clearing of vegetation will be restricted to the minimum area needed for construction and equipment.

- Cuts and fills for new roads will be sloped to minimize erosion and to facilitate re-vegetation. Riparian zones will be protected by federal lease stipulations and permit mitigation measures. The BLM seeding policy will be followed for all reclamation and reseeding activities.

- During reclamation activities, early succession plants will be used for re-vegetation to provide a fast growing cover crop to minimize and compete against noxious weeds.

- Operator reclamation plans will be developed in consultation with the surface owner. Reclaimed areas reseeded with native species will require a certified weed-free seed mix. The seed mix used on private surface will be developed in consultation with the surface owner. Successful revegetation will usually require at least two growing seasons to ensure a self-sustaining stand of seeded species.

- Where seeding is required, use appropriate seed mixture and seeding techniques approved by the BLM Authorized Officer.
- Generally, conduct reclamation with native seeds that are representative of the indigenous species present in the adjacent habitat. Document rationale for potential seeding with selected nonnative species. Possible exceptions would include use of nonnative species for a temporary cover crop to out-complete weeds. In all cases, ensure seed mixes are approved by the BLM Authorized Officer prior to planting
- Certify that all interim and final seed mixes, hay, straw, and hay/straw products are free of plant species listed on the Montana noxious weed list.
- Displaced farmland, whether in crop production or not, will be reclaimed to original soil productivity through adoption of standard reclamation procedures.

Vegetation - Invasive Species and Noxious Weeds

- To reduce the potential for the introduction of noxious weeds, clean off all equipment with pressure washing prior to operating on BLM lands. Removal of all dirt, grease, and plant parts that may carry noxious weed seeds or vegetative parts is required and may be accomplished with a pressure hose.
- Ensure all seed, hay, straw, mulch, or other vegetation material transported and used on public land for site stability, rehabilitation, or project facilitation is free of noxious weeds and noxious weed seed as certified by a qualified federal, state, or county officer.
- Operators will monitor noxious weed occurrence on all project areas and implement a noxious weed control program in cooperation with the BiFO to ensure noxious weed invasion does not become a problem. Reclamation /stabilization and maintenance materials used would be from weed seed free source to the extent practicable.
- The operator, grantee, or lessee will be responsible for the control of all noxious weed infestations on surface disturbances. Prior to any treatment, the operator, grantee, or lessee will be responsible for submission of Pesticide Use Proposals and subsequent Pesticide Use Reports. Control measures will adhere to those allowed in the Final Vegetation Treatments Using Herbicides on BLM in 17 Western States Programmatic EIS (June 2007) and ROD (September 2007). Herbicide approvals and treatments will be monitored by BiFO. Vehicle and hand application of herbicides near specials status plant species would be determined on a case-by-case basis and allowed only when the treatment would benefit special status plant species. Aerial application of herbicides is prohibited within one-half mile of special status plant locations, or other distance deemed safe by the Billings Field Office.

- It is the responsibility of the operator to develop a noxious weed prevention plan outlining ways to control noxious weeds on lands disturbed in association with oil and gas lease operations. Lease-associated weed control strategies are to be coordinated with any involved surface owners and local weed control boards. A pesticide-use proposal must be reviewed and approved by BLM prior to any herbicide application on lands disturbed by federal oil and gas lease operations. A pesticide application record must be made within 24 hours after completion of application of herbicides. Additional measures may be required to prevent the spread of noxious weeds.
- The noxious weed prevention plan must include measures to prevent the spread of weed seeds from any vehicles and equipment traveling from or prior to mobilizing it to, the project area.
- When managing weeds in areas of special status species, carefully consider the impacts of the treatment on such species. Whenever possible, hand spraying of herbicides is preferred over other methods.
- Do not conduct noxious and invasive weed control within 0.5 mile of nesting and brood rearing areas for special status species during the nesting and brood rearing season.
- Consider nozzle type, nozzle size, boom pressure, and adjuvant use and take appropriate measures for each herbicide application project to reduce the chance of chemical drift.
- All applications of approved pesticides will be conducted only by certified pesticide applicators or by personnel under the direct supervision of a certified applicator.
- Prior to commencing any chemical control program, and on a daily basis for the duration of the project, the certified applicator will provide a suitable safety briefing to all personnel working with or in the vicinity of the herbicide application. This briefing will include safe handling, spill prevention, cleanup, and first aid procedures.
- Do not apply pesticides within 440 yards (0.25 mile) of residences without prior notification of the resident.
- Areas treated with pesticides will be adequately posted to notify the public of the activity and of safe re-entry dates, if a public notification requirement is specified on the label of the product applied. The public notice signs will be at least 8½" x 11" in size and will contain the date of application and the date of safe re-entry.

Wildlife Habitat and Special Status Species

- Where effective, water developments would be managed to reduce the spread of West Nile virus.

- Well locations and associated road and pipeline routes would be selected and designed to avoid disturbances to areas of high wildlife value (e.g., raptor nest sites, wetland areas).
- Avoid activities and facilities that create barriers to the seasonal movements of big game and livestock.
- Reserve, workover, and production pits potentially hazardous to wildlife would be adequately protected (e.g., fencing, netting) to prohibit wildlife access as directed by the BLM.
- Install wildlife escape ramps in all watering troughs, including temporary water haul facilities, and open storage tanks. Pipe the overflow away from the last water trough on an open system to provide water at ground level.
- As appropriate, mark certain trees on BLM administered lands for protection as wildlife trees.
- Consider seasonal distribution of large wildlife species when determining methods used to accomplish weed and insect control objectives.
- Temporary and permanent access roads will be avoided on south-facing slopes within designated crucial big game winter range, where practicable.
- The planting of grasses, forbs, trees, or shrubs beneficial to wildlife will follow the BLM seeding policy. When needed, BLM will require installation of erosion and sedimentation control measures, such as riprap, erosion mats, mulch, bales, dikes or water bars. Riprap material and placement must be approved by the appropriate agency.
- All above-ground electrical poles and lines will be raptor-proofed to avoid electrocution following the criteria outlined in the Avian Power Line Interaction Committee (2006). ROW fencing would be kept to a minimum; if necessary, fences would consist of four-strand barbed wire meeting BLM Fencing Handbook 1741-1 standards for facilitating wildlife movement. Bottom wire would be smooth.
- For all breeding birds (sage grouse) observed, additional surveys would be conducted immediately prior to construction activities to search for active nest sites.
- To avoid potentially significant noise impacts, compressor engines would be located 2,500 feet or more from a dwelling or residence and from sage-grouse leks. Activities in crucial habitats would be avoided when practicable.
- Wildlife habitat mitigation would be carried out as quickly as possible or at the same time as the disturbance.

- Locatable mineral development activities would not be allowed within identified big game parturition areas between May 1 and June 30 or within raptor nesting areas from February 1 to July 31.
- Powerlines would be buried or otherwise constructed or modified to reduce impacts to wildlife where possible.
- Wildlife-proof fencing would be used on reclaimed area, in accordance with standards specified in BLM Fencing Handbook 1741-1, if it is determined that wildlife species are impeding successful vegetation establishment.
- Waste water / West Nile
  - Avoiding shallow depths in the pools. Depths should be sufficient to prevent the growth of wetland vegetation.
  - Provide steep slopes to micropool banks
  - Consider mechanical aeration of permanent pools
  - Make the micropool accessible to remove silt, vegetation, and maintain the outlet structure
  - Make the micropool accessible to treat with larvicide
  - Avoid rock at the outlet structures

Fisheries Habitat and Special Status Species

- Habitat improvement techniques: including stream bank stabilization, riparian management, enhancing in-stream cover, providing fish passage, and preventing entrainment. All reasonable alternatives for maintaining adequate in-stream flows, physical habitat, and water quality would be used, along with purchase of private water rights and negotiations on timing, duration and volume of flows and draw-downs where possible.
- If riparian zones are fenced to exclude grazing, fences will be 100’ from the stream banks, unless site-specific circumstances dictated otherwise.
- Habitat-improvement techniques will be used where appropriate to provide missing habitat components or improve existing habitats: Examples of these techniques include stream bank stabilization, riparian management, enhancement of in-stream cover, provisions for fish passage, and prevention of entrainment. All reasonable alternatives for maintaining adequate in-stream flows, physical habitat, and water quality will be used, along with the purchase of private water rights and negotiations on timing, duration and volume of flows and draw-downs where possible.

- At the project level, dead and down woody material would be retained in amounts that are within the range of natural variability for the plant community, to the extent compatible with reforestation objectives, fire hazard reduction standards, and public safety.
- For stream currently occupied by any special status species, do not allow extraction of water from ponds or pools if stream inflow is minimal (i.e. during drought situations) and extraction of water would lower existing pond or pool level.
- Activities such as stream crossings that could directly impact sensitive or protected fish species will be undertaken during non-spawning periods for these species. In the unlikely event that multiple, sensitive, or protected fish species with back-to-back spawning periods are present in the same stream reach, one of the following options will be exercised: selecting a nearby, alternative stream crossing site that does not provide suitable spawning habitat for the fish species of concern; using a nearby, existing stream crossing over the channel to avoid instream disturbances; or using shore-based equipment to position and extend the pipeline or other item (e.g., temporary bridge) across the stream, thereby avoiding in-channel activities.
- Habitat-improvement techniques will be used where appropriate to provide missing habitat components or improve existing habitats. Examples of these techniques include stream bank stabilization, riparian management, enhancing in-stream cover, provide fish passage, and prevent entrainment. All reasonable alternatives for maintaining adequate in-stream flows, physical habitat, and water quality will be used, along with purchase of private water rights and negotiations on timing, duration and volume of flows and draw-downs where possible.

Cultural and Heritage Resources

- Ensure a Class III cultural inventory will be conducted prior to surface disturbance commencement
- Ensure that all activities associated with the undertaking, within 100 meters of the discovery, are halted and the discovery is appropriately protected, until the BLM Authorized Officer issues a Notice to Proceed. A Notice to Proceed may be issued by the BLM under any of the following conditions:
    - Evaluation of potentially eligible resource(s) results in a determination that the resource(s) are not eligible;
    - The fieldwork phase of the treatment option has been completed; and
    - The BLM has accepted a summary description of the fieldwork performed and a reporting schedule for that work

- The operator/permittee will inform all persons associate with the project/undertaking that knowingly disturbing cultural resources (historic or archaeological) or collecting artifacts is illegal.
- Perform viewshed reclamation when the setting of a site contributes to the significance of the property.
- Implement protection measures to stop, limit, or repair damage to sites. A variety of protection measures described in BLM Manual 8140 may be used to protect the integrity of sites at risk , such as signs, fencing or barriers, trash removal, target shooting closures, erosion control, backfilling, repairing, shoring up, or stabilizing structures, restricting uses and access, and closures.
- Nominate eligible sites, districts, landscapes and traditional cultural properties for inclusion on the National Register of Historic Places
- Encourage public/volunteer involvement in the management of cultural resources through participation of established site steward programs and other programs.
- Specific plans would be developed for each site type unless included in other integrated activity plans. Such plans would include protective measures, Native American consultation, and regulatory compliance. These plans would also include but not be limited to developing a site monitoring system; identifying sites in need of stabilization, restoration, and protective measures (e.g. fences, surveillance equipment, etc.); developing research designs for selected areas/sites; designating sites/areas for interpretative development; identifying areas for cultural inventory where federal undertaking are expected to occur; and developing specific mitigation measures. The plan would designate sites, districts, and landmarks that would be nominated for inclusion in the National Register of Historic Places.
- Conduct inventory according to professional standards commensurate with the land-use activity, environmental conditions, and the potential for cultural resources
- Pro-actively reduce hazardous fuels or mitigate the potential hazard around archaeological and cultural sites that are susceptible to destruction by fire
- Reduce or eliminate imminent threats from natural or human caused deterioration or conflict with other resource uses
- Identify priority geographic areas for Section 110 cultural inventories based on a probability for unrecorded significant resources and/or resource need
- Ensure that all authorizations for land and resource use would comply with Section 106 of the National Historic Preservation Act, consistent with and subject to the objectives established in the RMP for the proactive use of cultural properties in the public interest

- Provide for legitimate field research by qualified scientists and institutions
- Allow for reconstruction, stabilization, maintenance, and interpretation of selected sites for public enjoyment and education
- Should National Register eligible cultural resources be found during an inventory, impacts to them would be mitigated, generally through avoidance. Should it be determined the cultural resources cannot be avoided; consultation with the State Historic Preservation Officer would be initiated. A program on mitigation would be developed via consultation between the Billings Field Office, the SHPO, and the Advisory Council on Historic Preservation
- Conduct regular monitoring of at-risk cultural sites to protect sites from conflicts with other resources uses and to document natural and human caused deterioration
- Establish and implement protective measures for sites, structures, objects, and traditional use areas that are important to Native American tribes with historical and cultural connections to the land, in order to maintain the viewshed, intrinsic values, and the auditory, visual, and aesthetic settings of the resources. Protection measures for undisturbed cultural resources and their natural setting would be developed in compliance with regulatory mandates and Native American consultation
- Conduct consultation process to identify both the resource management concerns and the strategies for addressing them through an interactive dialogue with Native American tribes with affinity to the project area
- Consult with affiliated Native American tribes for the protection of areas and items of traditional life-ways and religious significance that includes, but is not limited to burials, rock art, traditional use areas, religious active areas, and sacred sites
- Limit surface disturbing activities within selected Native American traditional cultural and religious sites for continued use by tribes. Traditional cultural sites would be identified in consultation with affiliated Native American tribes
- Protect burial sites, associated burial goods, and sacred items in accordance with the Native American Graves Protection and Repatriation Act and the Archaeological Resources Protection Act

Paleontological Resources

- Ensure a paleontological inventory will be conducted prior to surface disturbance commencement in areas with a PFYC rating of 3 or higher.

- When paleontological resources of potential scientific interest are encountered (including all vertebrate fossils and deposits of petrified wood), leave them intact and immediately bring them to the attention of the BLM Authorized Officer.
- BLM APD COAs provide guidance for notifying BLM and mitigating damage to paleontological resources discovered during oil and gas construction activities. Limitations include restricted use of explosives for geophysical exploration, monitoring requirements, and work stoppages for discovered resources.
- Reports of theft or damage to fossil resources would be responded to by appropriate BLM personnel
- Conduct regular monitoring to protect areas where unauthorized use may occur
- Where scientifically significant fossils are threatened by natural hazards or unauthorized collection, the BLM would work with permittees and other partners to salvage specimens and reduce future threats to resources at risk
- The BLM would work with local communities, interest groups, individuals, and other agencies to enhance the public's understanding and enjoyment of paleontological resources
- In areas where surface disturbance, either initiated by BLM or other land users, may threaten significant fossils, the BLM would follow its policy (see Manual and Handbook 8270-1) to assess any threat and mitigate damage.

Wildfire Ecology and Management

- Operators are required to comply with BLM-imposed conditions during times of high fire danger. Such conditions may include restrictions on types of activities allowed, hours of operation, and requirements for maintaining certain fire suppression equipment at the work site. Operators must maintain a current fire suppression plan.
- Use appropriate management after wildland fire, including re-planting, to promote reforestation on forested lands which are not expected to regenerate or have not shown regeneration within 15 years.
- Notify valid existing land users (such as mine claimants, oil and gas lessees, holders of rights-of-way, livestock permittees, and other BLM permitted users of the area, etc.) prior to implementation of prescribed fires that may affect their investments.
- Remove vegetation, where appropriate, to protect BLM facilities (e.g. range improvements, communication sites, recreation sites, etc.)

Fire Management for Sage-Grouse Conservation

- Develop field office-specific sage-grouse tool boxes containing maps, a list of resource advisors, contact information, local guidance, and other relevant information
- Provide localized maps to dispatch offices and extended attack incident commanders for use in prioritizing wildlife suppression resources and designing suppression tactics.
- Assign a sage-grouse resource advisor to all extended attack fires in or near key sage-grouse habitat areas. Prior to the fire season, provide training to sage-grouse resource advisors on wildfire suppression organization, objectives, tactics, and procedures to develop a cadre of qualified individuals.
- On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in sage-grouse habitat areas.
- During periods of multiple fires, ensure line officers are involved in setting priorities.
- To the extent possible locate wildfire suppression facilities (i.e. base camps, spike camps, drop points, staging areas, heli-bases, etc.) in areas where physical disturbance to sage-grouse habitat can be minimized. These include disturbed areas, grasslands, near roads/trails or in other areas where there is existing disturbance or minimal sagebrush cover.
- Power-wash all firefighting vehicles, to the extent possible, including engines, water tenders, personnel vehicles, and ATVs prior to deploying in or near sage-grouse habitat areas to minimize noxious weed spread.
- Minimize unnecessary cross-country vehicle travel during fire operations in sage-grouse habitat.
- Minimize burnout operations in key sage-grouse habitat areas by constructing direct fireline whenever safe and practical to do so.
- Utilize retardant and mechanized equipment to minimize burned acreage during initial attack.
- As safety allows, conduct mop-up where the black adjoins unburned islands, dog legs, or other habitat features to minimize sagebrush loss.

Fuels Management for Sage-Grouse Conservation

- Where applicable, design fuels treatment objectives to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patterns which most benefit sage-grouse habitat.

- Provide training to fuels treatment personnel on sage-grouse biology, habitat requirements, and identification of areas utilized locally.
- Use fire prescriptions that minimize undesirable effects on vegetation or soils (e.g. minimize mortality of desirable perennial plant species and reduce risk of hydrophobicity).
- Ensure proposed sagebrush treatments are planned with interdisciplinary input from BLM and/or state wildlife agency biologists and that treatment acreage is conservative in the context of surrounding sage-grouse seasonal habitats and landscape.
- Where appropriate, ensure that treatments are configured in a manner (e.g., strips) that promotes use by sage-grouse (See Connelly et al. 2000).
- Where applicable, incorporate roads and natural fuel breaks into fuel break design.
- Power-wash all vehicles and equipment involved in fuels management activities prior to entering the area to minimize the introduction of undesirable and/or invasive plants species.
- Design vegetation treatments in areas of high fire frequency to facilitate firefighter safety, reduce the risk of extreme fire behavior, and to reduce the risk and rate of fire spread to key and restoration habitats.
- Give priority for implementing specific sage-grouse habitat restoration projects in annual grasslands first to sites which are adjacent to or surrounded by sage-grouse key habitats. Annual grasslands are a second priority for restoration when the sites are not adjacent to key habitat but within two miles of key habitat. The third priority for annual grassland habitat restoration projects are sites beyond the two miles of key habitat. The intent is to focus restoration outward from existing, intact habitat.
- As funding and logistics permit, restore annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs.
- Emphasize the use of native plant species, recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions.
- Remove standing and encroaching trees within at least 100 meters of occupied sate-grouse leks and other habitats (e.g., nesting, wintering, and brood rearing) to reduce the availability of perch sites for avian predators as appropriate, and resources permit.
- Protect wildland areas from wildfire originating on private lands, infrastructure corridors, and recreational areas.

- Reduce the risk of vehicle or human-caused wildfires and the spread of invasive species by planting perennial vegetation (e.g. green strips) paralleling road rights-of-way.
- Strategically place and maintain pre-treated strips/areas (e.g., mowing, herbicide application and strictly managed grazed strips) to aid in controlling wildfire should wildfire occur near key habitat or important restoration areas (such as where investments in restoration have already been made).

Visual Resource Management

- Camouflage of all structures/facilities (e.g. wellheads, com sites, etc.) constructed as a result of a BLM authorized undertaking in Class II and Class III Visual Resource Management Areas will be required to preserve the viewshed. Camouflage will consist of placement of wellheads to reduce visual intrusions and painting of above-ground structures not requiring safety coloration an environmental color two shades darker than the surrounding environment.
- During implementation of vegetation treatments, create irregular margins around treatment areas to better maintain existing scenic character of the landscape.
- When feasible, bury utility lines on public lands when in the viewshed of residential or community development.
- Bury distribution powerlines or flow lines in or adjacent to access roads
- Use repetition of form, line, color, and texture to blend facilities with the surrounding landscape.
- Reclaim and recontour all disturbed areas, including access roads, to the original contour or a contour that blends with the surrounding topography.
- Avoid facility placement on steep slopes, ridge tops, and hilltops.
- Reclaim unused well pads within 1 year.

Mineral Exploration and Development

- Reduce impacts to wildlife and visual resources by applying the following, as appropriate:
  - Directional drilling of oil and gas wells
  - Drilling of multiple wells from a single pad
  - Closed drilling systems
  - Cluster development

  - Below-ground wellheads
  - Remote well monitoring
  - Piping of produced liquids to centralized tank batteries off site to reduce traffic to individual wells
  - Transportation planning (e.g. to reduce road density and traffic volumes)
  - Compensatory mitigation
  - Noise reduction techniques and designs
  - Installation of raptor anti-perch devices in greater sage-grouse habitat
  - Avoidance of human activity between 8 pm and 8 am from March 1 through May 15 within ¼ mile of the perimeter of occupied greater sage-grouse leks
  - Onsite bioremediation of oil field wastes and spills
  - Removal of trash, junk, waste, and other materials not in current use

- Reclaim all disturbed surface areas promptly, performing concurrent reclamation as necessary, and minimize the total amount of all surface disturbance.
- Ensure all surface soil is stripped prior to conducting operations, stockpiled, and reapplied during reclamation, regardless of soil quality. Minimize the length of time soil remains in stockpiles and the depth or thickness of stockpiles.
- Strip and separate soil surfaces horizons where feasible and reapply in proper sequence during reclamation.
- Establish vegetation cover on soil stockpiles that are to be in place longer than 1 year.
- Construct and rehabilitate temporary roads to minimize total surface disturbance, consistent with intended use.
- Consider temporary measures such as silt fences, straw bales, or mulching to trap sediment in sensitive areas until reclaimed areas are stabilized with vegetation.
- Reshape to the approximate original contour all areas to be permanently reclaimed, providing for proper surface drainage.

Mineral Extraction

- Applications for permit to drill would follow the best management practices as outlines in the BLM oil and gas Gold Book

(http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html), as well as on-shore regulations, individual surface use plans, and conditions for approval that may be part of the Record of Decision for EISs or Decision Records for environmental assessments/Findings of No Significant Impacts, Documentations of NEPA Adequacy, and Categorical Exclusions prepared for site-specific projects.

- Notify the BLM Authorized Officer within 5 days of completion of reclamation work so that timely compliance inspections can be completed.
- The operator will work with the BLM Authorized Officer on the containment of drilling fluids and drill hole cuttings. Adequately fence, post, or cover mud and separation pits, and hazardous material storage areas.

Fluid Minerals: Best Management Practices

- BMPs and standard operating procedures specific to coal bed natural gas (CBNG) can be found on pages 24 through 27 of the rod. Cited references are from the final SES
- Other more general oil and gas BMPs may be found at the following website: http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices.html. This location is subject to periodic updates and should be reviewed as needed. These measures are not lease stipulations and can be added to permits for new activities.

Solid Minerals: Best Management Practices

BLM's long term reclamation goals are to shape, stabilize, revegetate, or otherwise treat disturbed areas in order to provide a self-sustaining and productive use of the land in conformance with the land-use plan. Short-term reclamation goals are to stabilize disturbed areas and protect both disturbed and adjacent areas from unnecessary or undue degradation.

Reclamation for operations conducted under 43 CFR Group 3500 for the solid leasable minerals other than coal and oil shale; 43 CFR Group 3600 for mineral materials; and 43 CFR Parts 3802 and 3809 for locatable minerals. The authority for regulating surface coal mine reclamation was given to the Office of Surface Mining Reclamation and Enforcement when Congress enacted the Surface Mine Control and Reclamation Act of 1977.

The Federal Land Policy Management Act of 1976 (FLPMA) mandates that "the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values." Multiple-use management is defined in FLPMA (43 U.S.C. 1702(c)) and in regulations (43 CFR 1601.0-5(f)) as, in part, the "harmonious and coordinated management of the various resources without permanent impairment of the productivity of the lands and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." In

addition, FLPMA mandates that activities be conducted so as to prevent "unnecessary or undue degradation of the lands" (43 U.S.C. 1732(b)).

The Mining and Minerals Policy Act of 1970 (30 U.S.C. 21a) established the policy for the Federal Government relating to mining and mineral development. The Act states that it is policy to encourage the development of "economically sound and stable domestic mining, minerals, metal and mineral reclamation industries." The Act also states, however, that the Government should also promote the "development of methods for the disposal, control, and reclamation of mineral waste products, and the reclamation of mined land, so as to lessen any adverse impact of mineral extraction and processing upon the physical environment that may result from mining or mineral activities."

BLM exercises the authority to supervise exploration, mining, and reclamation activities on Indian lands pursuant to 25 U.S.C. 396d and 25 CFR Parts 211, 212, and 216. The standards developed for reclamation and closure on Federal lands will apply to operations conducted on Indian lands. The Government's trust responsibilities for the various Indian tribes and entities require that BLM ensure proper reclamation and closure practices. The regulations governing operations on Indian lands require that "adequate measures be taken to avoid, minimize, or correct damage to the environment--land, water, and air--and to avoid, minimize, or correct hazards to the public health and safety" (25 CFR 216.1).

The reclamation plan shall guide both the operator and the BLM toward a planned future condition of the disturbed area. This requires early coordination with the operator to produce a comprehensive plan. The reclamation plan will serve as a binding agreement between the operator and the regulatory agencies for the expected reclamation condition of the disturbed lands and must be periodically reviewed and modified as necessary. Because this is a binding agreement between the operator and the regulatory agency it must be monitored on a regular basis to ensure the reclamation plan is current. New information concerning the ore body, use of different mining methods than originally planned, etc., will require the review of the previous NEPA analysis to determine whether additional environmental documentation is warranted.

Although the operator will usually develop the reclamation plan, appropriate pre-planning, data inventory, and involvement in the planning process by the regulatory agencies, is essential to determine the optimum reclamation proposal. Most determinations as to what is expected should be made before the reclamation plan is approved and implemented. However, the regulations provide that plans can be modified to adjust to changing conditions or to correct for an oversight. The operator should not conduct surface disturbing activities without an approved plan. For notice level activities, the notice must contain an agreement to adhere to the reclamation requirements of the regulations and a proposal comprehensive enough for the BLM to ensure that unnecessary or undue degradation will not result. A reclamation plan should provide the following:

1. A logical sequence of steps for completing the reclamation process.
2. The specifics of how reclamation standards will be achieved.
3. An estimate of specific costs of reclamation.

4. Sufficient information for development of a basis of inspection and enforcement of reclamation and criteria to be used to evaluate reclamation success and reclamation bond release.
5. Sufficient information to determine if the reclamation plan is in conformance with the applicable BLM land-use plans, activity plans, and/or coastal zone management plans as appropriate.

In preparing and reviewing reclamation plans, the BLM and the operator must set reasonable, achievable, and measurable reclamation goals which are not inconsistent with the established land-use plans. Achievable goals will ensure reclamation and encourage operators to conduct research on different aspects of reclamation for different environments. These goals should be based on available information and techniques, should offer incentives to both parties, and should, as a result, generate useful information for future use.

The purposes of the reclamation plan are as follows:

1. Reclamation plans provide detailed guidelines for the reclamation process and fulfill Federal, State, County and other local agencies requirements. They can be used by regulatory agencies in their oversight roles to ensure that the reclamation measures are implemented, are appropriate for the site, and are environmentally sound.
2. Reclamation plans will be used by the operator throughout the operational period of the project and subsequent to cessation of exploration, mining, and processing activities. In turn, responsible agencies, including the BLM, will use the reclamation plan as a basis to review and evaluate the success of the reclamation program.
3. Reclamation plans should provide direction and standards to assist in monitoring and compliance evaluations.

Surface Disturbing Activities

For the purposes of this Handbook, surface-disturbing activities will be separated into three broad categories.

- Prospecting is the search for new deposits or mineral commodities. Prospecting activities may include: geophysical/ geochemical studies, and hand sampling of mineral specimens.
- Exploration includes efforts to determine the presence of economic deposits of mineral commodities. Exploration activities may include: road-building, drilling, trenching, bulk sampling, as well as any of the activities cited for prospecting.
- Development and mining or mineral processing is the process of extracting valuable minerals from the earth and removing impurities from these minerals. These activities may include: developmental drilling, road-building, underground mining (including shafts, portals, and adits), surface mining (including trenching, open pits, and strip mines), dredging, placer mining, construction of buildings and

facilities, use of leaching solutions or other chemicals, and the creation of tailings disposal sites and waste dumps.

See Table II-1 for a summary of activities and mineral categories/mine status.

National Environmental Policy Act

In accordance with the NEPA (NEPA), an environmental document will be prepared for those mineral actions which propose surface disturbance and have not been categorically excluded for the purpose of identifying and mitigating the impacts to the environment. Notices under 43 CFR 3809 are not Federal actions subject to the provisions of NEPA. The requirements and mitigation measures recommended in an Environmental Assessment (EA) or Environmental Impact Statement (EIS) shall be made a part of the reclamation plan.

Requirements for Reclamation Plan Content

The reclamation plan should be a comprehensive document submitted with the plan of operations, notice, exploration plan, or mining plan. It is expected that there will be changes to planned reclamation procedures over the life of the project. Any changes will generally be limited to techniques and methodology needed to attain the goals set forth in the plan. These changes to the plan may result from oversights or omissions from the original reclamation plan, permitted alterations of project activities, procedural changes in planned reclamation as a result of information developed by on-site revegetation research undertaken by the operator, results of monitoring data which indicates a new concern at the site and studies performed elsewhere, and/or changes in Federal/State regulations. Specific requirements are given in Manual Section 3042.

BLM Review of the Reclamation Plan

When reviewing the reclamation plan, the AO should:

1. Immediately upon its receipt, conduct a completeness review to determine whether the reclamation plan is technically and administratively complete.
2. Review the plan for content, both in the office and on-site with the operator, as necessary.
3. Recommend revisions, if necessary, as a result of the on-site review, NEPA documentation, and consultation with appropriate BLM personnel and other SMA's.
4. Ensure that the plan conforms to applicable State and Federal requirements.
5. Approve or accept the reclamation plan within the appropriate timeframes.
6. Set a schedule for inspection of operations and reclamation activities. Inspections must be scheduled at key points in the reclamation process, as well as at regular intervals.
7. Establish criteria for evaluating the success of reclamation.

When administering a reclamation plan, the AO should:

1. Conduct scheduled inspections and other inspections as necessary to ensure compliance with the reclamation plan. It is important to inspect work while it is in progress and before it is concealed by further work.
2. Document inspections in an established case file and discuss needed changes with the operator. These discussions with the operator should also be documented in the case file.
3. Ensure that required interim reclamation is current and in accordance with the plan.
4. Take appropriate action in the event of noncompliance.
5. Require revisions of the reclamation plan as necessary.
6. Monitor completed projects and evaluate the success of reclamation.
7. Accept final reclamation after a reasonable monitoring period and issue a decision. A reasonable monitoring period should not be less than 5 years for determining vegetation and erosion control success.

Mineral Material Sites: Standard Operating Procedures

Before establishing a new community pit, free use area, collection area or exclusive sale, a Plan of Operation and a Reclamation Plan will be prepared. The appropriate NEPA analysis will also be completed.

When appropriate and necessary a reclamation bond will be collected. Reclamation and management of the site will when appropriate consist of the following:

- Suitable topsoil, subsoil, or underlying soil parent material that is suitable for plant growth will be removed and stored for site restoration.
- Topcover stockpiles will be stabilized in order to prevent erosion and dust.
- The area will be fenced to exclude livestock, promote revegetation, increase safety and reduce theft.
- A weed control plan will be developed or weed control will be addressed in the Plan of Operation.
- Purchasers of material will be warned of potential weed seeds.
- The pit walls will not exceed a safe working angle.
- Reclaimed slopes will not exceed 2.5:1 (h:v).
- Disturbed areas will be reclaimed to blend as closely as possible with natural contours.
- Final blending to natural contours should be considered and incorporated into the Plan of Operation.

- Stockpiled topcover will be replaced as soon as practically possible.
- Disturbed areas will be scarified (where necessary) and reseeded as soon as possible in order to reduce erosion, dust and visual effects.
- Measures may need to be taken to reduce visual effects. Visual effects should be considered and incorporated into the Plan of Operation.
- A seed mix approved by BLM and appropriate for the area will be used.
- Erosion controls will be incorporated into the Plan of Operation.
- If dust becomes excessive, measures will be taken to reduce the hazard.
- The site will be returned to as close as possible to the "Post Mining Land Use"
- All remaining litter or trash shall be removed from the site.

Lands and Realty

- Corridors will be required for placement of roads, pipelines, and utility lines in a common area of disturbance wherever possible.
- Utility companies will manage vegetation in their rights-of-way, permit area or lease area for safe and reliable operation while minimizing impacts to vegetation and wildlife habitat.
- Keep removal and disturbance of vegetation to a minimum through construction site management e.g., using previously disturbed areas and existing easements, limiting equipment/materials storage and staging area sites, etc.
- Re-spread weed-free vegetation removed from the right-of-way to provide protection, nutrient recycling, and seed source.
- Ensure rights-of-way (ROW) and utility corridors use areas adjoining or adjacent to previously disturbed areas whenever possible.
- Stabilize disturbed areas within road ROWs and utility corridors with vegetation practices designed to hold soil in place and minimize erosion. Reestablish vegetation cover to increase infiltration and to provide additional protection from erosion.
- Construct sediment barriers when needed to slow runoff, allow deposition of sediment, and prevent transport from the site. Straining or filtration mechanisms may also be employed for the removal of sediment from runoff.

Livestock Grazing

1. Water developments:

    - Place water troughs off-site from springs, streams and riparian zones. To protect this type of water source, fence source (when possible) with wildlife friendly fencing materials.
    - Place wildlife escape ramps in all water tanks and troughs.
    - Trough height should not exceed twenty two (22) inches.
    - Completely drain troughs and tanks at the end of the grazing season.
    - Actual work in springs and stream beds will be done by hand where possible. If machinery is needed in these areas, it will be selected to minimize disturbance
    - After construction of spring head boxes, troughs, pipelines, and well sites, the areas will be cleaned up and refuse removed.
    - Cuts, fills, and excavation will be dressed and seeded to blend with surroundings. Pipelines will be buried where possible.
    - Original water sources will be protected, fenced if required, and an off-stream watering supply will be provided near the site.
    - Size of storage tanks and troughs will be designed to accommodate expected needs of livestock and wildlife using each water source.
    - Water will be left at the sight for wildlife. Wells will be cased to prevent cave-ins and well sites will be fenced.
    - Storage structures will be designed to provide water for wildlife. Drinking ramps (wildlife ramps) will be installed and storage structure heights will not prohibit young wildlife from obtaining water.

2. Fences:

    - Ensure that local wildlife needs are incorporated into any construction specifications on contract built fence projects.
    - Consider removing, replacing, or modifying existing fences in sage grouse habitat.
    - In critical sage grouse habitat, mark top wire with high-visibility marking material.

- Damaged gates and fences will be repaired or replaced according to landowner requirements at the operator‘s expense. When working on or near grazing lands, project-related construction equipment and vehicle movement will be minimized to avoid disturbance of grazing lands. Responsibilities for fence, gate, and cattle guard maintenance and noxious weed control will be defined in APDs, BLM approvals, or right-of-way (ROW) grants. Facilities will be placed to avoid or minimize impacts on livestock water.

Recreation

- For developed recreation, construct recreation sites and provide appropriate sanitation facilities to minimize impacts to resource values, maximize public health and safety, and minimize user conflicts related to approved activities and access within an area as appropriate.
- Use public education and/or physical barriers (such as rocks, posts, and vegetation) to direct or preclude uses and to minimize impacts to resource values.
- Oil and gas exploration activities will be coordinated for timing to minimize conflicts during recreation peak use periods.
- Dispersed recreation activity would be monitored to identify where this use may be impacting the vegetation resource.
- Seasonal restrictions on public vehicular access will be evaluated where there are wildlife habitat conflict and/or conflicts with wild horses and or wild horse habitat or road damage/maintenance issues.
- Do not allow surface or underground disturbance to occur within 100 yards (horizontally or vertically) of known cave resources.
- Where appropriate, do not allow ground disturbing activities within 100 yards of cave entrances, drainage areas, subsurface passages, and developed recreation sites. Do not dispose of waste material or chemicals in sinkholes or gates by cave entrances. If during construction activities any sinkholes or cave openings are discovered, case construction activities and notify the BLM Authorized Officer.
- The recreation permittee will assume liability for and clean up any and all releases of hazardous substances or oil (more than one quart) disposed on public lands as defined in the National Oil and Hazardous Substances Contingency Plan (40 CFR § 300). The permittee will immediately notify the BLM Authorized Officer of any and all releases of hazardous substances or oil (more than one quart) on public land.

Health and Safety

- Hazardous waste site clearance surveys will be conducted prior to surface disturbance commencement.
- Solid and hazardous wastes generated as a result of oil and gas lease operations will be disposed of in a manner and at a site approved by the appropriate regulating agency.
- Areas with steep topography will be developed in accordance with the BLM Gold Book (United States Department of the Interior and United States Department of Agriculture 2007) requirements. Lease roads and constructed facilities will be located in accordance with the approved APD. In areas of construction, topsoil will be stockpiled separately from other material, and be reused in reclamation of the disturbed areas. Unused portions of the producing well site will have topsoil spread over it and will be reseeded.
- Construction activities will be restricted during wet or muddy conditions and will be designed following BMPs to control erosion and sedimentation. If porous subsurface materials are encountered during pit construction, all onsite fluid pits will be lined. During road and utility ROW construction, surface soils will be stockpiled adjacent to the cuts and fills.
- Stream crossings will be designed to minimize impacts and not impede stream flow. Erosion control measures will be maintained and continued until adequate vegetation cover (as defined by BLM on a case-by-case basis) is reestablished. Vegetation will be removed only when necessary. Water bars will be constructed on slopes of 3:1 or steeper.
- Erosion control and site restoration measures will be initiated as soon as a particular area is no longer needed for exploration, production, staging, or access. Disturbed areas will be re-contoured to provide proper drainage.
- The road ditches would be flat bottomed and "V" ditches not allowed. Place water turn outs where appropriate to lessen the water impacts upon the ditches.
- Topsoil piles may be required to be seeded following the BLM seeding policy.
- Take measures to isolate, control, and properly dispose of toxic and hazardous materials.

Transportation– Travel Management (Road design and maintenance)

- Keep access roads to a minimum and use only when necessary.
- Design roads to minimize total disturbance, conform with topography, and minimize disruption of natural drainage patterns.

- Locate roads on stable terrain, such as ridgetops; natural benches; and flatter transitional slopes near ridges, valley bottoms, and moderate sideslopes, and away from slumps, slide-prone areas, concave slopes, clay beds, and where rock layers dip parallel to the slope. Locate roads on well-drained soil types; avoid wet areas.
- Construct roads for surface drainage by using outslopes, crowns, grade changes, drain dips, waterbars, and /or insloping, as appropriate, during road maintenance. Grade roads only as necessary.
- Sloping the road base to the outside edge for surface drainage is normally recommended for local spurs or minor collector roads where low traffic volume and lower traffic speeds are anticipated. This is also recommended in situations where long intervals between maintenance will occur and where minimum excavation is wanted. Outsloping is not recommended on steep slopes. Sloping the road base to the inside is an acceptable practice with steep sideslopes and where the underlying soil formation is very rocky and not subject to appreciable erosion or failure.
- Crown and ditching is recommended for arterial and collector roads where traffic volume, speed, intensity, and user comfort are considerations. Recommended gradients range from 0 percent (0%) to 15 percent (15%) where crown and ditching may be applied, as long as adequate drainage away from the road surface and ditch lines is maintained.
- Retain vegetation between roads and streams to filter runoff caused by roads.
- Use culverts that pass, at a minimum, a 50 year storm event and/or have a minimum diameter of 13 inches for permanent stream crossings and a minimum diameter of 18 inches for road crossdrains.
- Strip and stockpile topsoil ahead of construction of new roads, if feasible. Reapply soil to cut and fill slopes prior to revegetation.
- Use existing roads whenever possible rather than constructing new road systems.

B.12 BLM Wind Energy Development Program Policies and Best Management Practices (BMPs)

The BLM's Wind Energy Development Program will establish a number of policies and BMPs, provided below, regarding the development of wind energy resources on BLM administered public lands. The policies and BMPs will be applicable to all wind energy development projects on BLM-administered public lands. The policies address the administration of wind energy development activities, and the BMPs identify required mitigation measures that would need to be incorporated into project-specific Plans of Development (PODs) and right-of-way (ROW) authorization stipulations. Additional mitigation measures will be applied to individual projects, in the form of stipulations in the ROW authorization as appropriate, to address site-specific and species-specific issues.

These policies and BMPs were formulated through preparation of the Final Wind Energy PElS (BLM 2005). The PElS included detailed, comprehensive analysis of the potential impacts of wind energy development and relevant mitigation measures; reviews of existing, relevant mitigation guidance; and reviews of comments received during scoping and public review of the Draft PElS. Also available online at: http://windeis.anl.gov/

A.1 Policies

- The BLM will not issue ROW authorizations for wind energy development on lands on which wind energy development is incompatible with specific resource values. Lands that will be excluded from wind energy site monitoring and testing and development include designated areas that are part of the National Landscape Conservation System (NLCS) (e.g., Wilderness Areas, Wilderness Study Areas, National Monuments, NCAs,[1] Wild and Scenic Rivers, and National Historic and Scenic Trails) and Areas of Critical Environmental Concern (ACECs).[2] Additional areas of land may be excluded from wind energy development on the basis of findings of resource impacts that cannot be mitigated and/or conflict with existing and planned multiple-use activities or land use plans.

- To the extent possible, wind energy projects shall be developed in a manner that will not prevent other land uses, including minerals extraction, livestock grazing, recreational use, and other ROW uses.

- Entities seeking to develop a wind energy project on BLM-administered lands shall consult with appropriate federal, state, and local agencies regarding specific projects as early as in the planning process as appropriate to ensure that all potential construction, operation, and decommissioning issues and concerns are identified and adequately addressed.

- The BLM will initiate government-to-government consultation with Indian Tribal governments whose interests might be directly and substantially affected by activities on BLM-administered lands as early in the planning process as appropriate to ensure that construction, operation, and decommissioning issues and concerns are identified and adequately addressed.

- Entities seeking to develop a wind energy project on BLM-administered lands, in conjunction with BLM Washington Office (WO) and Field Office (FO) staff, shall consult with the U.S. Department of Defense (DoD) regarding the location of wind power projects and turbine siting as early in the planning process as appropriate. This consultation shall occur concurrently at both the installation/field level and the Pentagon/BLM WO level An interagency protocol agreement is being developed to establish a consultation process and to identify

[1] Wind energy development is permitted in one NCA, the California Desert Conservation Area (COCA), in accordance with the provisions of the California Desert Conservation Area Plan 1980. As Amended (BLM 1999).
[2] Although the MPDS developed for this PEIS (Section 2.2.1 and Appendix 8) did not exclude all of these lands at the screening level, they will be excluded from wind energy development.

the scope of issues for consultation. Lands withdrawn for military purposes are under the administrative jurisdiction of the DoD or a military service and are not available for issuance of wind energy authorizations by the BLM.

- The BLM will consult with the U.S. Fish and Wildlife Service (USFWS) as required by Section 7 of the Endangered Species Act of 1973 (ESA). The specific consultation requirements will be determined on a project-by-project basis.

- The BLM will consult with the State Historic Preservation Office (SHPO) as required by Section 106 of the National Historic Preservation Act of 1966 (NHPA). The specific consultation requirements will be determined on a project-by-project basis. If programmatic Section 106 consultations have been conducted and are adequate to cover a proposed project, additional consultation may not be needed.

- Existing land use plans wi1l be amended, as appropriate, to (1) adopt provisions of the BLM's Wind Energy Development Program, (2) identify land considered to be available for wind energy development, and (3) identify land that will not be available for wind energy development.

- The level of environmental analysis to be required under NEPA for individual wind power projects will be determined at the FO level. For many projects, it may be determined that a tiered environmental assessment (EA) is appropriate in lieu of an EIS. To the extent that the PElS addresses anticipated issues and concerns associated with an individual project, including potential cumulative impacts, the BLM will tier off of the decisions embedded in the PElS and limit the scope of additional project-specific NEPA analyses. The site specific NEPA analyses will include analyses of project site configuration and micrositing considerations, monitoring program requirements, and appropriate mitigation measures. In particular, the mitigation measures discussed in Chapter 5 of the PElS may be consulted in determining site-specific requirements. Public involvement will be incorporated into all wind energy development projects to ensure that all concerns and issues are identified and adequately addressed. In general, the scope of the NEPA analyses will be limited to the proposed action on BLM-administered public lands; however, if access to proposed development on adjacent non-BLM-administered lands is entirely dependent on obtaining ROW access across BLM-administered public lands and there are no alternatives to that access, the NEPA analysis for the proposed ROW may need to assess the environmental effects from that proposed development. The BLM's analyses of ROW access projects may tier off of the PElS to the extent that the proposed project falls within the scope of the PElS analyses.

- Site-specific environmental analyses will tier from the PElS and identity and assess any cumulative impacts that are beyond the scope of the cumulative impacts addressed in the PElS.

- The Categorical Exclusion (CX) applicable to the issuance of short-term ROWs or land use authorizations may be applicable to some site monitoring and testing activities. The relevant CX, established for the BLM in the DOI Departmental Manual 516, Chapter 11, Sec. 11.5, E(l9) (DOI 2004), encompasses "issuance of short-term (3 years or less) rights-of-way or land use authorizations for such uses as storage sites, apiary sites, and construction sites where the proposal includes rehabilitation to restore the land to its natural or original condition."

- The BLM will require financial bonds for all wind energy development projects on BLM-administered public lands to ensure compliance with the terms and conditions of the rights-of-way authorization and the requirements of applicable regulatory requirements, including reclamation costs. The amount of the required bond will be determined during the rights-of-way authorization process on the basis of site-specific and project-specific factors. The BLM may also require financial bonds for site monitoring and testing authorizations.

- Entities seeking to develop a wind energy project on BLM-administered public lands shall develop a project-specific Plan of Development (POD) that incorporates all BMPs and, as appropriate, the requirements of other existing and relevant BLM mitigation guidance, including the BLM's interim off-site mitigation guidance (BLM 2005a). Additional mitigation measures will be incorporated into the POD and into the ROW authorization as project stipulations, as needed, to address site-specific and species-specific issues. The POD will include a site plan showing the locations of turbines, roads, power lines, other infrastructure, and other areas of short-and long-term disturbance.

- The BLM will incorporate management goals and objectives specific to habitat conservation for species of concern (e.g., sage-grouse), as appropriate, into the POD for proposed wind energy projects.

- The BLM will consider the visual resource values of the public lands involved in proposed wind energy development projects, consistent with BLM Visual Resource Management (VRM) policies and guidance. The BLM will work with the ROW applicant to incorporate visual design considerations into the planning and design of the project to minimize potential visual impacts of the proposal and to meet the VRM objectives of the area.

- Operators of wind power facilities on BLM-administered public lands shall consult with the BLM and other appropriate federal, state, and local agencies regarding any planned upgrades or changes to the wind facility design or operation. Proposed changes of this nature may require additional environmental analysis and/or revision of the POD.

- The BLM's Wind Energy Development Program will incorporate adaptive management strategies to ensure that potential adverse impacts of wind energy development are avoided (if possible), minimized, or mitigated to acceptable levels. The programmatic policies and BMPs will be updated and revised as new

data regarding the impacts of wind power projects become available. At the project-level, operators will be required to develop monitoring programs to evaluate the environmental conditions at the site through all phases of development, to establish metrics against which monitoring observations can be measured, to identify potential mitigation measures, and to establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures and project-specific stipulations.

A.2 Best Management Practices (BMPs)

The BMPs will be adopted as required elements of project-specific PODs and/or as ROW authorization stipulations. They are categorized by development activity: site monitoring and testing, development of the POD, construction, operation, and decommissioning. The BMPs for development of the POD identify required elements of the POD needed to address potential impacts associated with subsequent phases of development.

A.2.1 Site Monitoring and Testing

- The area disturbed by installation of meteorological towers (i.e., footprint) shall be kept to a minimum.
- Existing roads shall be used to the maximum extent feasible. If new roads are necessary, they shall be designed and constructed to the appropriate standard.
- Meteorological towers shall not be located in sensitive habitats or in areas where ecological resources known to be sensitive to human activities (e.g., prairie grouse) are present. Installation of towers shall be scheduled to avoid disruption of wildlife reproductive activities or other important behaviors.
- Meteorological towers installed for site monitoring and testing shall be inspected periodically for structural integrity.

A.2.2 Plan of Development Preparation

General

- The BLM and operators shall contact appropriate agencies, property owners, and other stakeholders early in the planning process to identify potentially sensitive land uses and issues, rules that govern wind energy development locally, and land use concerns specific to the region.
- Available information describing the environmental and sociocultural conditions in the vicinity of the proposed project shall be collected and reviewed as needed to predict potential impacts of the project.
- The Federal Aviation Administration (FAA)-required notice of proposed construction shall be made as early as possible to identity any air safety measures that would be required.

- To plan for efficient use of the land, necessary infrastructure requirements shall be consolidated wherever possible, and current transmission and market access shall be evaluated carefully.

- The project shall be planned to utilize existing roads and utility corridors to the maximum extent feasible, and to minimize the number and length/size of new roads, lay-down areas, and borrow areas.

- A monitoring program shall be developed to ensure that environmental conditions are monitored during the construction, operation, and decommissioning phases. The monitoring program requirements, including adaptive management strategies, shall be established at the project level to ensure that potential adverse impacts of wind energy development are mitigated. The monitoring program shall identify the monitoring requirements for each environmental resource present at the site, establish metrics against which monitoring observations can be measured, identify potential mitigation measures, and establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures and BMPs.

- "Good housekeeping" procedures shall be developed to ensure that during operation the site will be kept clean of debris, garbage, fugitive trash or waste, and graffiti; to prohibit scrap heaps and dumps; and to minimize storage yards.

Wildlife and Other Ecological Resources

- Operators shall review existing information on species and habitats in the vicinity of the project area to identify potential concerns.

- Operators shall conduct surveys for federal and/or state-protected species and other species of concern (including special status plant and animal species) within the project area and design the project to avoid (if possible), minimize, or mitigate impacts to these resources.

- Operators shall identify important, sensitive, or unique habitats in the vicinity of the project and design the project to avoid (if possible), minimize, or mitigate impacts to these habitats (e.g., locate the turbines, roads, and ancillary facilities in the least environmentally sensitive areas; i.e., away from riparian habitats, streams, wetlands, drainages, or critical wildlife habitats).

- The BLM will prohibit the disturbance of any population of federal listed plant species.

- Operators shall evaluate avian and bat use of the project area and design the project to minimize or mitigate the potential for bird and bat strikes (e.g., development shall not occur in riparian habitats and wetlands). Scientifically rigorous avian and bat use surveys shall be conducted; the amount and extent of ecological baseline data required shall be determined on a project basis.

- Turbines shall be configured to avoid landscape features known to attract raptors, if site studies show that placing turbines there would pose a significant risk to raptors.

- Operators shall determine the presence of bat colonies and avoid placing turbines near known bat hibernation, breeding, and maternity/nursery colonies; in known migration corridors; or in known flight paths between colonies and feeding areas.

- Operators shall determine the presence of active raptor nests (i.e., raptor nests used during the breeding season). Measures to reduce raptor use at a project site (e.g., minimize road cuts, maintain either no vegetation or nonattractive plant species around the turbines) shall be considered.

- A habitat restoration plan shall be developed to avoid (if possible), minimize, or mitigate negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species. The plan shall identify revegetation, soil stabilization, and erosion reduction measures that shall be implemented to ensure that all temporary use areas are restored. The plan shall require that restoration occur as soon as possible after completion of activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

- Procedures shall be developed to mitigate potential impacts to special status species. Such measures could include avoidance, relocation of project facilities or lay-down areas, and/or relocation of biota.

- Facilities shall be designed to discourage their use as perching or nesting substrates by birds. For example, power lines and poles shall be configured to minimize raptor electrocutions and discourage raptor and raven nesting and perching.

Visual Resources

- The public shall be involved and informed about the visual site design elements of the proposed wind energy facilities. Possible approaches include conducting public forums for disseminating information, offering organized tours of operating wind developments, and using computer simulation and visualization techniques in public presentations.

- Turbine arrays and turbine design shall be integrated with the surrounding landscape. Design elements to be addressed include visual uniformity, use of tubular towers, proportion and color of turbines, nonreflective paints, and prohibition of commercial messages on turbines.

- Other site design elements shall be integrated with the surrounding landscape. Elements to address include minimizing the profile of the ancillary structures, burial of cables, prohibition of commercial symbols, and lighting. Regarding lighting, efforts shall be made to minimize the need for and amount of lighting on ancillary structures.

Roads

- An access road siting and management plan shall be prepared incorporating existing BLM standards regarding road design, construction, and maintenance such as those described in the BLM 9113 Manual (BLM 1985) and the Surface Operating Standards for Oil and Gas Exploration and Development (RMRCC 1989) (i.e., the Gold Book).

Ground Transportation

- A transportation plan shall be developed, particularly for the transport of turbine components, main assembly cranes, and other large pieces of equipment. The plan shall consider specific object sizes, weights, origin, destination, and unique handling requirements and shall evaluate alternative transportation approaches. In addition, the process to be used to comply with unique state requirements and to obtain all necessary permits shall be clearly identified.

- A traffic management plan shall be prepared for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration.

Noise

- Proponents of a wind energy development project shall take measurements to assess the existing background noise levels at a given site and compare them with the anticipated noise levels associated with the proposed project.

Noxious Weeds and Pesticides

- Operators shall develop a plan for control of noxious weeds and invasive species, which could occur as a result of new surface disturbance activities at the site. The plan shall address monitoring, education of personnel on weed identification, the manner in which weeds spread, and methods for treating infestations. The use of certified weed-free mulching shall be required. If trucks and construction equipment are arriving from locations with known invasive vegetation problems, a controlled inspection and cleaning area shall be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces.

- If pesticides are used on the site, an integrated pest management plan shall be developed to ensure that applications would be conducted within the framework of BLM and DOI policies and entail only the use of EPA-registered pesticides. Pesticide use shall be limited to nonpersistent, immobile pesticides and shall only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.

Cultural/Historic Resources

- The BLM will consult with Indian Tribal governments early in the planning process to identify issues regarding the proposed wind energy development, including issues related to the presence of cultural properties, access rights, disruption to traditional cultural practices, and impacts to visual resources important to the Tribe(s).

- The presence of archaeological sites and historic properties in the area of potential effect shall be determined on the basis of a records search of recorded sites and properties in the area and/or, depending on the extent and reliability of existing information, an archaeological survey. Archaeological sites and historic properties present in the area of potential effect shall be reviewed to determine whether they meet the criteria of eligibility for listing on the National Register of Historic Places (NRHP).

- When any rights-of-way application includes remnants of a National Historic Trail, is located within the viewshed of a National Historic Trail's designated centerline, or includes or is within the viewshed of a trail eligible for listing on the NRHP, the operator shall evaluate the potential visual impacts to the trail associated with the proposed project and identify appropriate mitigation measures for inclusion as stipulations in the POD.

- If cultural resources are present at the site, or if areas with a high potential to contain cultural material have been identified, a cultural resources management plan (CRMP) shall be developed. This plan shall address mitigation activities to be taken for cultural resources found at the site. Avoidance of the area is always the preferred mitigation option. Other mitigation options include archaeological survey and excavation (as warranted) and monitoring. If an area exhibits a high potential, but no artifacts were observed during an archaeological survey, monitoring by a qualified archaeologist could be required during all excavation and earthmoving in the high-potential area. A report shall be prepared documenting these activities. The CRMP also shall (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of artifacts and destruction of property on public land.

Paleontological Resources

- Operators shall determine whether paleontological resources exist in a project area on the basis of the sedimentary context of the area, a records search for past paleontological finds in the area, and/or, depending on the extent of existing information, a paleontological survey.

- If paleontological resources are present at the site, or if areas with a high potential to contain paleontological material have been identified, a paleontological resources management plan shall be developed. This plan shall include a

mitigation plan for collection of the fossils; mitigation could include avoidance, removal of fossils, or monitoring. If an area exhibits a high potential but no fossils were observed during survey, monitoring by a qualified paleontologist could be required during all excavation and earthmoving in the sensitive area. A report shall be prepared documenting these activities. The paleontological resources management plan also shall establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of fossils on public land.

Hazardous Materials and Waste Management

- Operators shall develop a hazardous materials management plan addressing storage, use, transportation, and disposal of each hazardous material anticipated to be used at the site. The plan shall identify all hazardous materials that would be used, stored, or transported at the site. It shall establish inspection procedures, storage requirements, storage quantity limits, inventory control, nonhazardous product substitutes, and disposition of excess materials. The plan shall also identify requirements for notices to federal and local emergency response authorities and include emergency response plans.

- Operators shall develop a waste management plan identifying the waste streams that are expected to be generated at the site and addressing hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures. This plan shall address all solid and liquid wastes that may be generated at the site.

- Operators shall develop a spill prevention and response plan identifying where hazardous materials and wastes are stored on site, spill prevention measures to be implemented, training requirements, appropriate spill response actions for each material or waste, the locations of spill response kits on site, a procedure for ensuring that the spill response kits are adequately stocked at all times, and procedures for making timely notifications to authorities.

Storm Water

- Operators shall develop a storm water management plan for the site to ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion.

Human Health and Safety

- A safety assessment shall be conducted to describe potential safety issues and the means that would be taken to mitigate them, including issues such as site access, construction, safe work practices, security, heavy equipment transportation, traffic management, emergency procedures, and fire control.

- A health and safety program shall be developed to protect both workers and the general public during construction, operation, and decommissioning of a wind energy project. Regarding occupational health and safety, the program shall identify all applicable federal and state occupational safety standards; establish safe work practices for each task (e.g., requirements for personal protective equipment and safety harnesses; Occupational Safety and Health Administration [OSHA] standard practices for safe use of explosives and blasting agents; and measures for reducing occupational electric and magnetic fields [EMF] exposures); establish fire safety evacuation procedures; and define safety performance standards (e.g., electrical system standards and lightning protection standards). The program shall include a training program to identify hazard training requirements for workers for each task and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies shall be established.

- Regarding public health and safety, the health and safety program shall establish a safety zone or setback for wind turbine generators from residences and occupied buildings, roads, rights-of-ways, and other public access areas that is sufficient to prevent accidents resulting from the operation of wind turbine generators. It shall identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction or decommissioning activities. It shall also identify measures to be taken during the operation phase to limit public access to hazardous facilities (e.g. permanent fencing would be installed only around electrical substations and turbine tower access doors would be locked).

- Operators shall consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) shall be identified and addressed in the traffic management plan.

- If operation of the wind turbines is expected to cause significant adverse impacts to nearby residences and occupied buildings from shadow flicker, low-frequency sound, or EMF, site-specific recommendations for addressing these concerns shall be incorporated into the project design (e.g., establishing a sufficient setback from turbines).

- The project shall be planned to minimize electromagnetic interference (EMI) (e.g., impacts to radar, microwave, television, and radio transmissions) and comply with Federal Communications Commission [FCC] regulations. Signal strength studies shall be conducted when proposed locations have the potential to impact transmissions. Potential interference with public safety communication systems (e.g., radio traffic related to emergency activities) shall be avoided.

- The project shall be planned to comply with FAA regulations, including lighting regulations, and to avoid potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.

- Operators shall develop a fire management strategy to implement measures to minimize the potential for a human-caused fire.

A.2.3 Construction

General

- All control and mitigation measures established for the project in the POD and the resource-specific management plans that are part of the POD shall be maintained and implemented throughout the construction phase, as appropriate.

- The number and size/length of roads, temporary fences, lay-down areas, and borrow areas shall be minimized. Topsoil from all excavations and construction activities shall be salvaged and reapplied during reclamation.

- All areas of disturbed soil shall be reclaimed using weed-free native grasses, forbs, and shrubs. Reclamation activities shall be undertaken as early as possible on disturbed areas.

- All electrical collector lines shall be buried in a manner that minimizes additional surface disturbance (e.g., along roads or other paths of surface disturbance). Overhead lines may be used in cases where burial of lines would result in further habitat disturbance.

- Operators shall identify unstable slopes and local factors that can induce slope instability (such as groundwater conditions, precipitation, earthquake activities, slope angles, and the dip angles of geologic strata). Operators also shall avoid creating excessive slopes during excavation and blasting operations. Special construction techniques shall be used where applicable in areas of steep slopes, erodible soil, and stream channel crossings.

- Erosion controls that comply with county, state, and federal standards shall be applied. Practices such as jute netting, silt fences, and check dams shall be applied near disturbed areas.

Wildlife

- Guy wires on permanent meteorological towers shall be avoided, however, may be necessary on temporary meteorological towers installed during site monitoring and testing.

- In accordance with the habitat restoration plan, restoration shall be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

- All construction employees shall be instructed to avoid harassment and disturbance of wildlife, especially during reproductive (e.g. courtship and nesting) seasons. In addition, pets shall not be permitted on site during construction.

Visual Resources

- Operators shall reduce visual impacts during construction by minimizing areas of surface disturbance, controlling erosion, using dust suppression techniques, and restoring exposed soils as closely as possible to their original contour and vegetation.

Roads

- Existing roads shall be used, but only if in safe and environmentally sound locations. If new roads are necessary, they shall be designed and constructed to the appropriate standard and be no higher than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Excessive grades on roads, road embankments, ditches, and drainages shall be avoided, especially in areas with erodible soils. Special construction techniques shall be used, where applicable. Abandoned roads and roads that are no longer needed shall be recontoured and revegetated.

- Access roads and on-site roads shall be surfaced with aggregate materials, wherever appropriate.

- Access roads shall be located to follow natural contours and minimize side hill cuts.

- Roads shall be located away from drainage bottoms and avoid wetlands, if practicable.

- Roads shall be designed so that changes to surface water runoff are avoided and erosion is not initiated.

- Access roads shall be located to minimize stream crossings. All structures crossing streams shall be located and constructed so that they do not decrease channel stability or increase water velocity. Operators shall obtain all applicable federal and state permits.

- Existing drainage systems shall not be altered, especially in sensitive areas such as erodible soils or steep slopes. Potential soil erosion shall be controlled at culvert outlets with appropriate structures. Catch basins, roadway ditches, and culverts shall be cleaned and maintained regularly.

Ground Transportation

- Project personnel and contractors shall be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and

site-specific conditions, to ensure safe and efficient traffic flow and to reduce wildlife collisions and disturbance and airborne dust.

- Traffic shall be restricted to the roads developed for the project. Use of other unimproved roads shall be restricted to emergency situations.
- Signs shall be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consideration shall be given to limiting construction vehicles traveling on public roadways during the morning and late afternoon commute time.

Air Emissions

- Dust abatement techniques shall be used on unpaved, unvegetated surfaces to minimize airborne dust.
- Speed limits (e.g., 25 mph [40 kph]) shall be posted and enforced to reduce airborne fugitive dust.
- Construction materials and stockpiled soils shall be covered if they are a source of fugitive dust.
- Dust abatement techniques shall be used before and during surface clearing, excavation, or blasting activities.

Excavation and Blasting Activities

- Operators shall gain a clear understanding of the local hydrogeology. Areas of groundwater discharge and recharge and their potential relationships with surface water bodies shall be identified.
- Operators shall avoid creating hydrologic conduits between two aquifers during foundation excavation and other activities.
- Foundations and trenches shall be backfilled with originally excavated material as much as possible. Excess excavation materials shall be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.
- Explosives shall be used only within specified times and at specified distances from sensitive wildlife or streams and lakes, as established by the BLM or other federal and state agencies.
- Borrow material shall be obtained only from authorized and permitted sites. Existing sites shall be used in preference to new sites.

Noise

- Noisy construction activities (including blasting) shall be limited to the least noise-sensitive times of day (i.e., daytime only between 7 a.m. and 10 p.m.)

- All equipment shall have sound-control devices no less effective than those provided on the original equipment. All construction equipment used shall be adequately muffled and maintained.
- All stationary construction equipment (i.e. compressors and generators) shall be located as far as possible from nearby residences.
- If blasting or other noisy activities are required during the construction period, nearby residents shall be notified in advance.

Cultural and Paleontological Resources

- Unexpected discovery of cultural or paleontological resources during construction shall be brought to the attention of the responsible BLM authorized officer immediately. Work shall be halted in the vicinity of the find to avoid further disturbance to the resources while they are being evaluated and appropriate mitigation measures are being developed.

Hazardous Materials and Waste Management

- Secondary containment shall be provided for all on-site hazardous materials and waste storage, including fuel. In particular, fuel storage (for construction vehicles and equipment) shall be a temporary activity occurring only for as long as is needed to support construction activities.
- Wastes shall be properly containerized and removed periodically for disposal at appropriate off-site permitted disposal facilities.
- In the event of an accidental release to the environment, the operator shall document the event, including a root cause analysis, appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Documentation of the event shall be provided to the BLM authorized officer and other federal and state agencies, as required.
- Any wastewater generated in association with temporary, portable sanitary facilities shall be periodically removed by a licensed hauler and introduced into an existing municipal sewage treatment facility. Temporary, portable sanitary facilities provided for construction crews shall be adequate to support expected on-site personnel and shall be removed at completion of construction activities.

Public Health and Safety

- Temporary fencing shall be installed around staging areas, storage yards, and excavations during construction to limit public access.

A.2.4 Operation

General

- All control and mitigation measures established for the project in the POD and the resource-specific management plans that are part of the POD shall be maintained and implemented throughout the operational phase, as appropriate. These control and mitigation measures shall be reviewed and revised, as needed, to address changing conditions or requirements at the site, throughout the operational phase. This adaptive management approach would help ensure that impacts from operations are kept to a minimum.

- Inoperative turbines shall be repaired, replaced, or removed in a timely manner. Requirements to do so shall be incorporated into the due diligence provisions of the rights-of-way authorization. Operators will be required to demonstrate due diligence in the repair, replacement, or removal of turbines; failure to do so could result in termination of the rights-of-way authorization.

Wildlife

- Employees, contractors, and site visitors shall be instructed to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. In addition, any pets shall be controlled to avoid harassment and disturbance of wildlife.

- Observations of potential wildlife problems, including wildlife mortality, shall be reported to the BLM authorized officer immediately.

Ground Transportation

- Ongoing ground transportation planning shall be conducted to evaluate road use, minimize traffic volume, and ensure that roads are maintained adequately to minimize associated impacts.

Monitoring Program

- Site monitoring protocols defined in the POD shall be implemented. These will incorporate monitoring program observations and additional mitigation measures into standard operating procedures and BMPs to minimize future environmental impacts.

- Results of monitoring program efforts shall be provided to the BLM authorized officer.

Public Health and Safety

- Permanent fencing shall be installed and maintained around electrical substations, and turbine tower access doors shall be locked to limit public access.

- In the event an installed wind energy development project results in EMI, the operator shall work with the owner of the impacted communications system to resolve the problem. Additional warning information may also need to be conveyed to aircraft with onboard radar systems so that echoes from wind turbines can be quickly recognized.

A.2.5 Decommissioning

General

- Prior to the termination of the rights-of-way authorization, a decommissioning plan shall be developed and approved by the BLM. The decommissioning plan shall include a site reclamation plan and monitoring program.
- All management plans, BMPs, and stipulations developed for the construction phase shall be applied to similar activities during the decommissioning phase.
- All turbines and ancillary structures shall be removed from the site.
- Topsoil from all decommissioning activities shall be salvaged and replied during final reclamation.
- All areas of disturbed soil shall be reclaimed using weed-free native shrubs, grasses, and forbs.
- The vegetation cover, composition, and diversity shall be restored to values commensurate with the ecological setting.

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